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#### 29th Annual Session

AMERICAN CONGRESS OF PHYSICAL MEDICINE

September 4, 5, 6, 7, 8, 1951

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## American Congress of Physical Medicine

29th Annual

Scientific and Clinical Session

and

Instruction Seminar

September 4, 5, 6, 7 and 8, 1951



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In Conjunction with the

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#### TENTATIVE SCHEDULE Physicians and registered physical and Physicians only may enroll for letter occupational therapists may enroll for series numbered series TUESDAY MORNING — SEPTEMBER 4 TUESDAY MORNING - SEPTEMBER 4 (A) 10:00-10:50 A.M. | (B) 11:00-11:50 A.M. (1) 10:00-10:50 A.M. | (2) 11:00-11:50 A.M. Electromyography Electromyograph, Scoliosis: Causes, Prognosis, Physical Hemiplegia Basic Principles Clinical Aspects Physical (with demonstration) Rehabilitation Treatment TUESDAY AFTERNOON — SEPTEMBER 4 TUESDAY AFTERNOON — SEPTEMBER 4 1:30-2:20 P.M. (D) 2:30-3:20 P.M. 2:30-3:20 P.M. 1:30-2:20 P.M. I Functional Anatomy Spine and Trunk Functional Anatomy Spine and Trunk Low Back Pain with Post Reduction Reference to Treatment of Manipulation Fractures WEDNESDAY MORNING — SEPTEMBER 5 WEDNESDAY MORNING — SEPTEMBER 5 8:30-9:20 A.M. (F) 9:30-10:20 A.M. 8:30-9:20 A.M. | (6) 9:30-10:20 A.M. Deconditioning in Deconditioning in Crutch Walking Physical Treatment the Invalid and the Invalid and of Peripheral the Aged the Aged Demonstration Nerve Lesions THURSDAY MORNING — SEPTEMBER 6 (G) 8:30-9:20 A.M. | (H) 9:30-10:20 A.M. THURSDAY MORNING — SEPTEMBER 6 8:30-9:20 A.M. | 9:30-10:20 A.M. (7) 8:30-9:20 A.M. Treatment of Rheuma-Electrical Stimulation Essentials of **Electrical Stimulation** Types of Current and Clinical Physiology - Types of Current toid Derelicts by Hor-Muscle and Clinical Physiology monal Therapy, Ortho-Testing pedic Procedures and (with demonstration) Rehabilitation FRIDAY MORNING — SEPTEMBER 7 FRIDAY MORNING - SEPTEMBER 7 (K) 9:30-10:20 A.M. Technic of Scientific 8:30-9:20 A.M. (10) 9:30-10:20 A.M. 8:30-9:20 A.M. Technic of Scientific Essentials of Muscle Occupational Therapy: Medical Writing Medical Writing Reeducation (with Prescription demonstration) Writing

Note: The Committee on Education of the American Congress of Physical Medicine is in charge of the instruction seminar. It is purposely planned to limit the subjects in any year to a few topics in order to devote enough time to those subjects to give those attending a good review, both from the standpoint of basic knowledge and from the clinical standpoint. Certain groups of these subjects will be repeated every three to five years.

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#### THE ANALYSIS OF MUSCLE ACTION POTENTIALS IN THE DIFFERENTIAL DIAGNOSIS OF NEUROMUSCULAR DISEASES \*

ARTHUR T. RICHARDSON, M.B., B.S., D.PHYS. MED.

LONDON, ENGLAND

With the more general use of clinical electromyography in the diagnosis of neuromuscular diseases, limitations of the methods employed in the investigation of peripheral nerve injuries have become apparent. The detection and recognition of normal motor unit action potentials, of fibrillation action potentials and of the highly polyphasic motor unit action potentials associated with reinnervation are adequate to assess the state of a peripheral nerve injury.1 It is, however, becoming of increasing importance in lesions other than peripheral nerve injuries to analyze muscle action potentials accurately. Thus the simple myograph is giving way to more elaborate apparatus.

It is important that this elaboration of electromyographic equipment be subordinated to the requirements of the clinician, who has no place for unwieldy lengths of photographic material requiring processing. As an alternative to the continuous film camera, equipment incorporating magnetic tape recording has been developed at St. Thomas' Hospital under the direction of Dr. P. Bauwens. Some of the results obtained by the use of this equipment on patients are summarized in this paper.

#### Technique

A full account of the technical details of this equipment has been given by Bauwens and Styles2 but for convenience a short description of the apparatus follows in so far as it relates to the results described in this paper.

The electromyograph consists of a conventional two channel high gain differential amplifier. Each channel contains a push-pull triode preamplifier feeding a Tonnies compressor and followed by two pentode stages in cascade. The over-all time constant of the amplifier is 0.1 second and the frequency response is 6 decibels down at 1.6 cycles and 8 kilocycles. The inphase-antiphase gain ratio is greater than 10,000 to 1. Monitoring cathode ray tubes, meters, and a loud speaker system are incorporated in the myograph. For the recording of muscle action potentials a closed loop of magnetic recording tape 1.5 meters in length is used. This tape moves at the rate of 1 meter per second over recording, playback and erasing heads. The operation of a foot switch cuts out the recording and erasing heads and brings into use the playback head. This results in the display on one beam of a double beam long persistance cathode ray tube, the whole of the 1.5 seconds' recording; the second beam of this tube displays a time scale (see illustrations). Normally the duration of the sweep is substantially the same as that of one revolution of the loop of tape, but, because the point of sweep triggering and the velocity of the time base are variable, any part of the recording may be selected and analyzed (the illustrations in this article are photographs of single sweeps of the double beam cathode ray tube displaying parts of the tape recordings),

The coaxial needle electrodes used are S. W. G. 24 stainless steel with copper cores. The over-all time constant of the apparatus from the input of the electromyograph to the output of the magnetic tape recorder is 5 milliseconds. The development from this apparatus of one with provision for the recording of the low frequency compo-

<sup>\*</sup> This study was aided by a research grant from St. Thomas' Hospital.

\* Read at the Twenty-Eighth Annual Session of the American Congress of Physical Medicine, Boston,

<sup>&</sup>quot;Read at the Twenty-Eightin Admust Seasons of the Electrical Activity of Voluntary Muscle in Aug. 30, 1950.

1. Weddell, G.; Feinstein, B., and Pattle, R. E.; The Electrical Activity of Voluntary Muscle in Man Under Normal and Pathological Conditions, Brain 67:178 (Sept.) 1944.

2. Bauwens, P., and Styles, P.; The Analysis of Action Potentials in Electromyography, lecture delivered before the Institute of Electrical Engineers, London, May, 1950, to be published.

nents as a frequency-modulated carrier wave is at present being investigated and promises to eliminate the lower frequency limitations inherent in orthodox magnetic tape record-

#### Normal Muscle Action Potentials

In the change from the electrical silence of relaxed normal muscle<sup>3</sup> to the interference pattern (fig. 1B) of full volitional activity<sup>3 a, b, e</sup> the appear-

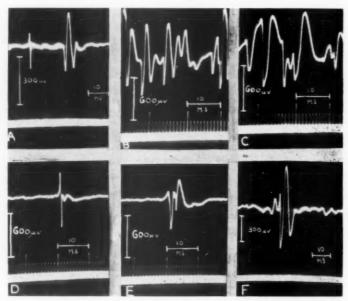


Fig. 1. — A, fibrillation potential and a normal motor unit potential (thenar eminence muscle; partial denervation). B, normal interference pattern. C, same as B at the point of fatigue. D, short duration normal motor unit potential (normal biceps muscle). E, polyphasic normal unit potential (normal biceps muscle). F, long duration motor unit potential initiating contraction (deltoid muscle); progressive spinal muscular atrophy).

ance of increasing numbers of motor unit potentials discharging at increasing frequencies is characteristic. Sustained maximal voluntary contraction to the point of fatigue results in a change in the interference pattern (fig. 1 C). The appearance suggests that large motor unit potentials predominate in fatigue.3d It is, however, difficult to analyze these large potentials accurately, because they are detected in normal muscle not as isolated repetitive units, but only as part of the interference pattern on maximal voluntary contraction. As distinct from this, in some cases of neurogenic atrophy, isolated large potentials appear at an earlier stage in voluntary contraction4 or even initiate it (fig. 1 F). In normal limb muscles we have recorded motor unit potentials of from 2 milliseconds' total duration (fig. 1D) to 10 milliseconds' total duration. Seventy-six per cent of the motor unit potentials in our records

12:129, 1949,

<sup>2. (</sup>a) Adrian, E. D., and Bronk, D. W.: The Discharge of Impulses in Motor Nerve Fibers, J. Physiol. 67:110 (March) 1929. (b) Smith, O. C.: Action Potentials from Single Motor Units in Voluntary Contraction, Am. J. Physiol, 168:629 (June) 1934. (c) Buchthal, F., and Clemmesen, S.: On the Differentiation of Muscle Atrophy by Electromyography, Acta psychiat. 16:143, 1941. (d) Denny-Brown, D.: Interpretation of the Electromyography are Arch. Neurol. & Psychiat. 61:99 (Feb.) 1949. (c) Weddell; Peinstein and Faulle. E.: Electromyography in Muscular Dystrophies, J. Neurol., Neurosurg. & Psychiat. 19:149.

have a total duration of between 4 milliseconds and 7 milliseconds. In measuring these potentials, care has been taken to allow for amplifier overshoot. Motor unit action potentials of shorter duration and a higher proportion of polyphasic potentials, are found in normal facial muscles. The wave form of the motor unit potentials is commonly triphasic or diphasic with occasional polyphasic forms (fig., 1E).

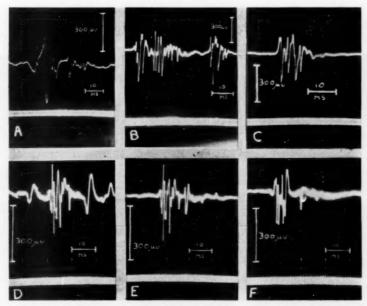


Fig. 2. — A, polyphasic motor unit potentials in reinnervation (biceps muscle; brachial plexus injury). B, Polyphasic motor unit potentials (biceps muscle; acute anterior poliomyelitis). C, polyphasic motor unit potential in reinnervation (brachioradialis muscle; infective polynemics). D, E, F, single repetitive polyphasic potential in reinnervation, showing change in form (tibialis anierior muscle, lateral pophiteal nerve injury).

## Fibrillation Potentials in Denervation and Their Relation to the Sluggish Response

The practice of studying the response of muscle to electrical stimulation as a preliminary to electromyographic exploration is to be recommended.<sup>5</sup> Although in peripheral nerve injuries the detection of fibrillation action potentials is remarkably constant in the presence of lower motor neuron degeneration, it is less constant in chronic neurogenic lesions producing the same degree of denervation.

Of 107 patients with denervation from various causes seen by us, while 105 responded sluggishly to galvanic type stimuli, in only 92 (all showing a sluggish response) could fibrillation potentials be detected. In 10 of these 92 patients fibrillation potentials were detected only with difficulty. These figures apply to patients subjected to preliminary warming to stimulate fibrillation but not given neostigmine. It was observed that fibrillation potentials were most difficult to detect in recovering lesions, long-standing

Richardson, A. T.: Clinical Electromyography in the Royal Air Force, Proc. Roy. Soc. Med. 42:587 (Aug.) 1949.

lesions and motor neuron disease (progressive spinal-muscular atrophy and amyotrophic lateral sclerosis). The series of cases described included two cases (one of progressive spinal muscular atrophy and one of an ulnar nerve lesion secondary to cubitus valgus) in which fibrillation was detected in the absence of a sluggish response.

#### Polyphasic Motor Unit Potentials in Regeneration

Regeneration of lower motor neurons is accompanied with characteristic electromyographic signs. First, fibrillation potentials are more difficult to detect and, second, highly polyphasic motor unit potentials are detected in

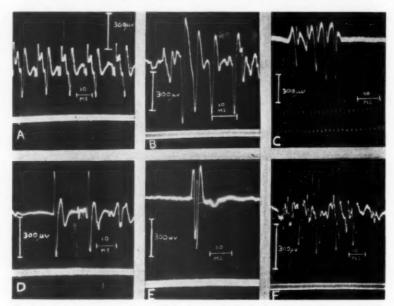


Fig. 3. — Spontaneous motor unit potentials in  $A_i$ , osteoarthritis of spine (thenar eminence muscle);  $B_i$  tetany (first dorsal interosseous muscle);  $C_i$  cervical rib (thenar eminence muscle);  $D_i$  carpal tunnel syndrome (thenar eminence muscle);  $E_i$  motor neuron disease (progressive muscular atrophy), (fasciculation) (biceps muscle);  $F_i$  facial contracture.

increasing numbers with recovery.<sup>6</sup> The polyphasic potentials are at first made up of only a few fiber potentials (fig. 2A) and are of low voltage, discharging under voluntary control but with a "semispontaneous" action. As reinnervation progresses, the motor unit potentials become more polyphasic, and in their most characteristic form of development may be 15 milliseconds in duration and 500 microvolts or less in amplitude (fig. 2A to F). Analysis of a single repetitive polyphasic potential shows that the fiber component is not numerically constant (fig. 2D, E, F).

Regeneration of the facial nerve leads to the presence of short duration and polyphasic potentials of low amplitude. The electromyographic appearance is then comparable with that found in myopathic lesions of the limb muscles. Included in the illustration of regenerating motor unit po-

Jasper, H., and Ballem, G.: Unipolar Electromyograms of Normal and Denervated Human Muscle, J. Neurophysiol. 12:231 (July) 1849. Kugelburg, E., and Peterson, L.: "Insertion Activity" in Electromyography, J. Neurol. Neurosurg, & Psychiat, 12:268, 1948. Weddell; Feiterien, and Pattle.

tentials is a picture (fig. 2B) illustrating the type of polyphasic motor unit potentials which may be encountered in paretic muscles after the acute stage of poliomyelitis. The presence of these suggests a peripheral lesion accompanying the central one, a finding compatible with the abnormal peripheral fatigue found in this disease.7

#### Irritative Phenomena: Spontaneous Motor Unit Discharges and High Frequency Discharges

Spontaneous single or grouped motor unit discharges are occasionally encountered in muscles when the motor nerve becomes involved in an irritative process.8 The most characteristic sign is the appearance of grouped motor unit potentials (fig. 3). The largest grouping that we have seen

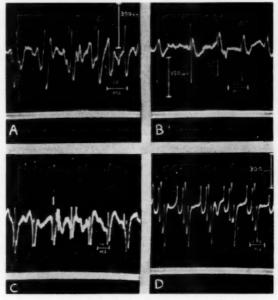


Fig. 4. — Trains of oscillations in A, dystrophia myotonica (thenar eminence muscle: B, progressive muscular atrophy (biceps muscle); C, facial nerve palsy (regenerating), (depressor anguli oris muscle); D, progressive spinal muscular atrophy (biceps muscle).

consisted of sequences of six potentials (case of a cervical rib). These grouped discharges may be seen to undergo changes in the number of components on repetition. Analysis of these grouped potentials reveals that they are composed of identical components separated by intervals of sufficient duration to allow for the refractory period. This indicates that they are repeated discharges of a single lower motor neuron.

Spontaneous motor unit activity was not a constant finding in our cases of nerve pressure lesions. It was detected in only 12 of 47 cases. The case

Hodes, R.: The Electromyographic Study of Defects of Neuromuscular Transmission in Poliomyelitis, Arch. Neurol. & Psychiat. 59:438 (March) 1948. Buchthal, F., and Honke, P.: Electromyographic Examination of Patient Suffering From Poliomyelitis, Ant. Ac. up to 6 Months After Acute Stage of the Disease, Acta. med. scandinav. 116:1148, 1944.
 Kugelburg, E.: Injury Activity and Trigger Zones in Human Nerves, Brain 69:310 (Dec.) 1946. Brazier, M. A. B.; Watkins, A. L. and Michelson, J. J.: Electromyography in Differential Diagnosis of Ruptured Cervical Disks, Arch. Neurol. & Psychiat. 56:651 (Dec.) 1946.

series included spinal lesions (27 cases) cervical rib and costoclavicular syndrome (5 cases) carpal tunnel syndrome (6 cases) and ulnar compression neuritis (9 cases).

The most constant finding was a reduction of the interference pattern (26 of 47 cases) or the presence of fibrillation potentials (24 of 47 cases). In 11 of the 47 cases results of electromyographic examination were normal. In five of the 27 cases of nerve root compression secondary to spinal lesions (osteoarthritis and prolapsed intervertebral disks) results of electromyographic examination were also normal, although clinical signs of disturbed sensory nerve conduction were present. Grouped discharges are one of the earliest signs of facial contracture (fig. 3 F). They may be detected in

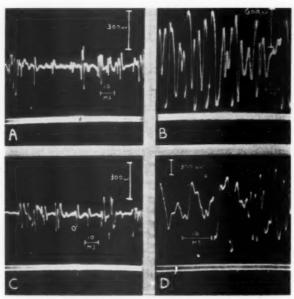


Fig. 5. — Disintegration of motor unit potentials in myamhenia gravis. A, after half-minute sustained contraction (right tibialis anterior muscle clinically weak). B, after half-minute sustained contraction (left tibialis anterior muscle of same case as  $\alpha$  and C; normal muscle); C, same as A; D, same as A and C after neostignize.

tetany<sup>9</sup> (fig.  $3\,B$ ) and uremia. These spontaneous motor unit potentials are to be distinguished from the volitional double motor unit potentials which sometimes initiate voluntary contraction and which in our experience have no pathological significance. The regular rhythm of the motor unit discharges in these conditions is different from the irregular single motor unit discharges (often polyphasic in form) found, for instance, in cases of propressive spinal muscular atrophy (fasciculation) (fig.  $3\,E$ ).

The most dramatic phenomenon attributable to hyperexcitability encountered in electromyography is undoubtedly the protracted trains of oscillations which are invariably found in the myotonias (8 of 8 cases of dys-

<sup>9.</sup> Kugelburg, E.: Activation of Human Nerves by Hyperventilation and Hypocalcemia, Arch. Neurol. & Psychiat. 60:153 (Aug.) 1947.

trophia myotonica). These high frequency potentials, which may be described as "quasi-musical-sounds" or "diving aeroplanes," occur in a variety of forms (fig. 4). Some have dimensions comparable with those of fibrillation potentials (fig. 4B); others resemble motor unit potentials (fig. 4A and C), while some can be described only as extravagant or eccentric in form (fig. 4D). Their variety of form and their persistence after complete curarization support the assumption that they are due to the summation of neighboring muscle fiber potentials.

Other conditions in which high frequency discharges have been found are progressive muscular atrophy (3 of 22 cases) and as a transient phenom-

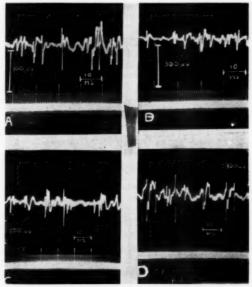


Fig. 6. — Disintegration of motor unit potentials. A and B, pseudohypertrophic muscular dystrophy (biceps muscle); C, dermatomyositis (abductor digiti minimi muscle); D, polyneuritis (biceps muscle).

enon in isolated instances in fatigued normal muscle, malignant infiltration of nerve roots and acute anterior poliomyelitis.

#### Disintegration of the Motor Unit Potential

Reference has been made to the large residual motor unit potentials which may be found in neurogenic lesions. These differ from the motor unit potentials found in advanced myopathic lesions in which the loss of muscle fiber activity within the motor unit results in a predominance of short duration and polyphasic units of low amplitude. The development of this change is best seen with the onset of fatigue in myasthenia gravis (fig. 5)<sup>11</sup> when disintegration of the motor unit potentials occurs. This is in contrast to the change which occurs in normal muscle fatigue (fig. 5 B).

<sup>10. (</sup>a) Kugelburg, E.: Electromyography in Muscular Disorders. J. Neurol., Neurosurg. & Psychiat. 10:122 (Aug.) 1947. (b) Footnote 5.
11. Lindskyr, D. B.: Myographic and Electromyographic Studies in Myasthenia Gravia, Brain 38:470, 1935, Kugelburg, 19a

In muscular dystrophy this disintegration has been found in 6 of 6 cases of advanced disease (fig. 6.4 and B).

Similar disintegrated motor unit potentials may be found in dermatomyositis (fig. 6C) and rarely in peripheral neuritis (fig. 6D). In the latter condition the presence of these abnormal motor unit potentials would seem to indicate a neuronitis distal to the branching of the lower motor neuron.

An advance in electromyographic technique made possible by the use of a signal storage unit is briefly described. The results obtained from the use of this apparatus are discussed and illustrated. Reference is made to the incidence of fibrillation potentials, of spontaneous motor unit activity and of the sluggish response in neuromuscular diseases.

It is a pleasure to acknowledge the help and advice of Dr. P. Bauwens, Physician-in-Charge, Physical Medicine Department, St. Thomas' Hospital, under whose direction the work has been carried out. I also wish to thank Dr. J. St. C. Elkington, Physician-in-Charge, Neurological Department, St. Thomas' Hospital, for permission to publish the results of electromyographic examinations on his cases.

#### **HOT PACKING \***

FRANCIS X. SWEENEY, M.D.

and

EMERY K. STONER, M.D.

PHILADELPHIA

Since the advent of Sister Kenny much has been written pro1 and con2 concerning the efficacy of hot packs in the relief of pain and spasm as seen in poliomyelitis and other neuromuscular disorders. Though this modality is today generally accepted in the treatment of acute poliomyelitis, there is nothing but conjecture as to its mode of operation. The purpose of this study was to determine the thermal effects of hot packs on skin, subcutaneous and deep muscle temperatures.

#### Methods

Twenty-six observations were performed on three normal adult subjects, two men and one woman, lying in an ambient temperature of 25 ± 1 C., in a fasting state. Skin, subcutaneous and deep muscle temperatures were measured by means of copper-constantan thermocouples and recorded by a modified Brown continuous recording potentiometer. A thermocouple was taped on the skin in the center of the packing area. Subcutaneous (6 to 10 mm.) and deep muscle (about 50 mm.) temperatures were measured with 5 inch needle thermocouples, so inserted that the tips of the needles were under

<sup>\*</sup>From the Center for Instruction and Research in Physical Medicine Graduate School of Medicine, University of Pennsylvania.

\*Aided by a grant from the National Foundation for Infantile Paralysis, Inc.

\*Read at the Twenty-Eighth Annual Session of the American Congress of Physical Medicine, Boston, Aug. 30, 1950.

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the central part of the pack, and the hubs were outside the packing area and shielded from the pack.

Other thermocouples were taped to the pads of the left index finger, the right index finger and both great toes. Oral or rectal temperatures were measured by calibrated clinical thermometers.

After a control period of 15 to 30 minutes, the left thigh was packed by a qualified physical therapist in the conventional manner. Single packs were applied for lengths of time varying from every five minutes to one hour. The application of the packs was timed so that they would be applied close to the precise instant that the skin temperature beneath the pack was being recorded. In one series of packings, the temperature between the pack and the skin was recorded every 15 seconds, and in another series every 40 seconds, in order to determine the rate of cooling in the first few minutes. Other temperatures were recorded every two minutes.

#### Results

Chart 1 shows the skin, subcutaneous and deep muscle temperature curves of a representative series of packs at 12 to 14 minute intervals. The

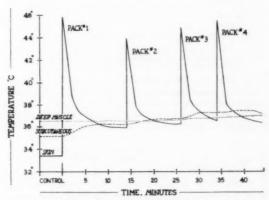


Chart 1. - Temperature curves of a representative series of hot packs.

deep muscle temperature did not begin to rise until well after the second pack was applied and then rose 0.5 degree (C.) over the control temperature. The usual total rise for deep muscle temperatures of all series was 0.3 to 0.9 degree. The subcutaneous temperature began to rise immediately with the application of the first pack, its greatest increase being here — viz., 1.1 degrees (C.) and then increased at about half this rate with each increment of heat. The skin temperature rise and fall were precipitous. This temperature leveled off to approximately body temperature in 10 minutes. The temperature of the packs as they came from the spinner was about 65 C. It required about three to four seconds to remove the pack from the spinner, wrap it on the thigh and cover with oiled silk and a dry blanket. Some idea of the rapidity of cooling of the pack is evidenced by the fact that the maximum temperature recorded between the skin and the pack was 49 C., hence a loss of 16 degrees or more in a matter of seconds.

Chart 2 delineates the rate of temperature fall of pack 1 from the previous series. Skin temperatures were recorded every 20 seconds. The mean rate of fall here was 3.2 degrees (C.) per minute for the first two minutes. In all series the mean rate of fall varied between 2.7 and 3.5 degrees per minute for the first two minutes and 0.11 to 0.18 degree per minute for the next 20

minutes. This demonstrates that pack temperatures are greatly influenced by the rapidity of application.

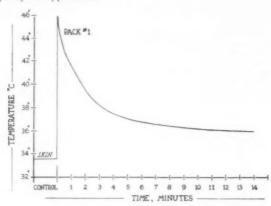


Chart 2. — Rate of temperature fall of pack 1 from previous series. The temperature was recorded every 20 seconds; the mean rate of fall in the skin temperature was 3.2 degrees (C.) in the first two minutes.

Chart 3 illustrates peripheral vasodilatation as seen in another series of packings at 10 to 14 minute intervals. The graphs of both fingers as well as those of the toes paralleled each other; hence for purposes of clarity only the readings from one toe and one finger are shown. It should be noted, however, that the contralateral as well as the packed side showed the same effect. Be-

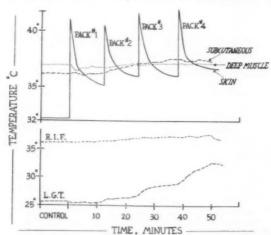


Chart 3. — Temperature curves produced by a series of packs, illustrating peripheral vasodilatation. R. I. F. indicates right index finger; L. G. T., left great toe.

fore packing, the fingers were in a state of vasodilatation while the toes were approximately at room temperature. Six to eight minutes after the first pack was applied, the toe temperatures began to increase and various levels of vasodilatation were reached. The maximum finger and toe temperatures

were seen 40 to 50 minutes after beginning of packing, whether it was a single pack or repeated packs.

Chart 4 depicts the temperature effects during two successive one hour packs. In this series the maximum increase in subcutaneous temperature was 2.5 degrees (C.) seen six minutes after the application of the second one

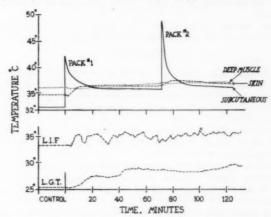


Chart 4. - Temperature curves of two one hour packs applied consecutively

hour pack. Likewise, the maximum deep muscle increase was 0.9 degree, also seen during the second one hour pack. Despite the rapid initial cooling, the skin temperatures stay well above control levels — i. e., 3 to 4 degrees (C.) during the one hour packing periods. Peripheral vasodilatation is produced and maintained throughout the entire packing period. The gradient between deep muscle, subcutaneous tissue and skin temperatures is decreased in the packed area. These temperatures tend to approximate body temperature. In none of the observations were the rectal or oral temperatures increased. Mottling of the skin in the packed area was produced in all subjects as a result of the packing.

#### Comment

This study shows that hot packs applied to one thigh do elevate the skin, subcutaneous and deep muscle temperatures and produce peripheral vaso-dilatation. The initial relatively transitory effects on skin temperature are impressive. The postulated skin reflex mechanism, whether it increases or decreases blood flow, seems to continue to act without further stimulus, for the initial skin effects are dissipated in a relatively short time. Perhaps the continued elevated skin temperatures, as noted above, or the sedative effects of a fairly constant environment after the initial skin stimulation serve to evoke the aforementioned skin reflex. Because of the vasomotor involvement<sup>3</sup> seen in acute and chronic poliomyelitis we feel that the peripheral vasodilating effects seen by us in the normal person would be enhanced in the poliomyelitis patient.

It may well be, however, that the vasodilating effects of heat conceal the modus operandi of its analgesic effects. It was shown that the gradient

Collins, V. J.; Foster, W. L., and West, W. J.: Vasomotor Disturbances in Poliomyelitis with Special Reference to Treatment with Paravertebral Sympathetic Block, New England J. Med. 236:694, 1347.

between deep muscle, subcutaneous and skin temperatures is decreased in the packed area. Wells, showed that the optimum temperature for the relief of pain by heating is approximately that of the blood and deep tissues. He advanced the idea that it may be not the heating per se which mediates the relief of pain but rather the equalization of superficial and deep tissue temperatures. If this is true, the type of heat — i. e., dry or moist — would be of no concern.

However, mechanically, packing may be better because usually groups of muscles are involved and are more easily heated by packing.

#### Conclusions

- 1. The initial skin effects of hot packs are relatively transitory.
- 2. Body temperature is not increased by hot packing of one thigh.
- Hot packing of one thigh can cause reflex peripheral vasodilatation
  of the fingers and toes. This is as pronounced on the contralateral side as
  on the packed side.
- Hot packs decrease the gradient between deep muscle, subcutaneous and surface temperatures in the packed area. These temperatures approximate body temperature.
- 5. Both the local and the peripheral temperature effects of hot packing of one thigh are similar whether the packs are repeated every 5, 15 or 60 minutes. Hence, the optimum packing time seems to be in the neighborhood of sixty minutes.
- 6. The initial skin temperatures are influenced by the rapidity of application of the packs.
  - 7. The highest tolerable skin temperatures are between 45 and 50 C.

#### IMPORTANT NOTICE

Certified diplomates of the American Board of Physical Medicine and Rehabilitation who wish to replace their certificate which carried the former name, American Board of Physical Medicine, may order a replacement certificate at a cost of \$3.00. Orders and checks should be sent to the American Board of Physical Medicine and Rehabilitation, 30 North Michigan Ave., Chicago 2, Illinois.

Wells, H. S.: Temperature Equalization for the Relief of Pain: An Experimental Study of the Relation of Thermal Gradients to Pain, Arch. Phys. Med. 28:135, 1947.

#### ELECTRICALLY HEATED HOT PACKS

Experimental Study of a New Method

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EMILY E. MUELLER, R.P.T., M.S.
and
SEDGWICK MEAD, M.D.

ST. LOUIS

For some time hot packs have been used in the treatment of poliomyelitis, arthritis and certain other diseases, but there is still considerable difference of opinion as to whether the application of hot packs — at least in poliomyelitis — is a physiologically sound form of treatment. If, however, one chooses to use hot packs, it is desirable to find a simpler and less time-consuming method of applying the packs. For this purpose the General Electric Company designed an apparatus that includes "pads" that are heated by built-in thermal elements while the pads are on the area to be treated.

The purpose of this study was, not to discuss the principles and use of hot packs as such, but to determine (1) whether this apparatus provided a simpler yet safe application of moist heat, and (2) whether or not this method of application could produce the same heating effects as are produced by the well known conventional type hot packs.

#### Electrically Heated Packs

Figure 1 shows the portable electrical instrument designed by the General Electric Company and submitted to us for evaluation. By electrically

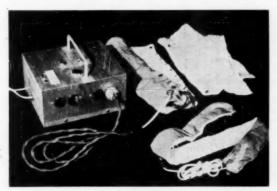


Fig. 1. - Electric hot pack.

generating heat rapidly within a moistened pack and then interrupting the current in alternating, automatic cycles, the apparatus is intended to produce effects which roughly simulate heat shock, followed by a cooling period. The term heat shock as it is used here may be defined as a rapid, significant rise in pack temperature and the physiological effects resulting therefrom.

From the Division of Physical Medicine, Washington University School of Medicine.
 Read at the Twenty-Eighth Annual Session of the American Congress of Physical Medicine, Boston, Aug. 30, 1950.

The test unit — 8½ by 10 by 5 inches and weighing 22 pounds — operates on 110 volt, 60 cycle alternating current. This specific unit has four outlets, permitting the use of one to four pads simultaneously. The pads are of two types: an open sleeve, 12 by 15 inches to be laced around the extremity, and a long strip to be wound around the extremity. The pads are made of terry cloth, with a rubberized outer covering. Moistened strips of wool are to be placed between the skin and the pads. The power output is approximately 1 watt per square inch. The apparatus automatically and intermittently regulates the current flow to the pads in a cycle of 2½ minutes on and 12½ minutes off.

The first test procedure was to determine the pack temperature produced under simulated clinical conditions on a healthy human subject with the automatically regulated cycle. After this first procedure other cycles were studied to determine which cycle produced pack temperatures similar to those produced by conventional type hot packs. To this end the apparatus was modified to include a switch that short-circuited the timing mechanism and thus made it possible to regulate the cycles manually and yary them for ex-

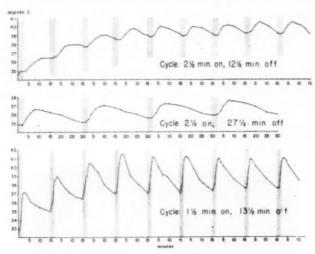


Fig. 2. — Temperatures of electrically heated packs,

perimental purposes. A National Bureau of Standards certified thermometer (—1 to 101 C. in 0.2 degree steps) was placed between the moist wool layer and the skin (the temperature thus obtained will henceforth be called pack temperature). Pack temperatures were recorded at half minute intervals for periods of two to three hours. The cycles tested were 2½ minutes on —12½ minutes off; 2½ minutes on —27½ minutes off, and 1½ minutes on —13½ minutes off. For the last experimental cycle, test runs were done both with and without the inner wool layer.

The upper graph of figure 2 shows the changes in pack temperature with the use of the  $2\frac{1}{2}$  minute on  $-12\frac{1}{2}$  minute off cycle (room temperature, 24.0 C.). Approximately 45 minutes (3 on-and-off periods) was required before the pack temperatures reached near maximum. The experiment was continued for an additional 30 minutes beyond that shown on the graph, but the temperature curves did not deviate significantly from that of the preceding on-and-off period.

Since the variations in temperature from one on-and-off period to another in this experiment were not more than 1.5 degrees C., this cycle was considered inadequate to produce the conditions of heat shock. Hence the cycle  $2\frac{1}{2}$  minutes on  $-27\frac{1}{2}$  minutes off was used, to allow a longer period for cooling. The middle graph of figure 2 shows the pack temperatures with the use of this cycle (room temperature, 24.4 C.). This cycle appeared to be even less adequate to produce conditions of heat shock: The temperature variation in any one on-and-off period was practically the same as for the cycle  $2\frac{1}{2}$  minutes on  $-12\frac{1}{2}$  minutes of; in addition, the maximum temperature attained was 0.5 to 1.0 degree C. lower.

Not shown on any graph is the third experimental cycle tested,  $1\frac{1}{2}$  minutes on  $-13\frac{1}{2}$  minutes off. The use of this cycle caused the pack temperatures to rise gradually to a peak temperature which was approximately 1 degree C. less than that produced by the use of the  $2\frac{1}{2}$  minutes on  $-12\frac{1}{2}$  minutes of cycle provided by the apparatus. Thus the shortening of the heating phase does not significantly change the over-all shape of the temperature curve but does result in a downward shifting of the whole curve. On the basis of the tendencies of the temperature changes produced by the use of the cycles tested, it was considered fruitless to test other cycles for the production of heat shock because (1) the maximum temperature developed during the  $2\frac{1}{2}$  minutes of heating, regardless of the length of the cooling period, was about the maximum that the subject could tolerate, and (2) the shortening of the heating period only decreased the peak temperature.

The fact that the rise and fall of pack temperatures during the experiments were quite gradual and not adequate to produce the conditions of heat shock was attributed to the insulating effect of the inner wool layer. Pack temperatures were then determined without the use of this layer. The cycle used was 1½ minutes on —13½ minutes off (room temperature, 24.4 C.), as seen in the lower graph of figure 2. This procedure resulted in a more abrupt temperature rise and fall, a higher peak temperature and a greater temperature variation during any one on-and-off period than with any other cycle tested. Since on two occasions the procedure resulted in the production of first degree burns in the experimental subject, the elimination of the wool layer is considered unsafe.

#### Conventional Packs

The next procedure was to compare the temperature changes produced by the electrically heated packs with those produced by conventional type hot packs. For this comparison venous blood and muscle temperatures as well as pack temperatures were recorded for both types of heat application. For the electrically heated packs in this procedure only two cycles were selected for comparison:  $2\frac{1}{2}$  minutes on  $-12\frac{1}{2}$  minutes off, and  $1\frac{1}{2}$  minutes on  $-13\frac{1}{2}$  minutes off cycle was provided by the apparatus; the  $1\frac{1}{2}$  minutes on  $-13\frac{1}{2}$  minutes off cycle without the wool layer produced the highest and most abrupt pack temperatures; the fact that the one cycle produced a very gradual rise and the other — even though considered unsafe — a very abrupt rise made these two cycles very apt for comparison one with the other and both with the conventional type hot packs.

For the conventional type hot packs two series were selected; one in which the packs were applied for 15 minute periods, the interval between applications being just loss of the changing of the packs, and the other in which the pack was applied for a two hour period and immediately reapplied for a 20 minute period.

After the removal of the last pack, muscle temperatures were recorded for an additional 45 minutes.

A needle thermocouple (copper and constantan) was constructed for use with an enclosed lamp and scale reflecting galvanometer. Venous blood temperatures were determined by inserting the needle into the antecubital vein; muscle temperatures were determined by inserting the needle approximately 1 cm. into the extensor muscles of the forearm.

A total of 15 experiments were performed on 3 subjects. To determine the validity of the results, control experiments were performed on the right and the left arm of one subject and on the left arms of two subjects. In the conventional type hot pack series, muscle and pack temperatures were recorded simultaneously during one run, and blood temperatures were recorded during another run under comparable conditions. With the electrically heated pack series each of the three temperatures was recorded separately during separate runs.

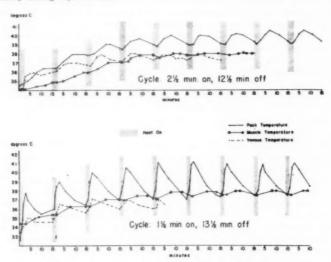


Fig. 3. - Blood, muscle and pack temperatures produced by electrically heated packs.

Figure 3 shows the blood and muscle temperature changes in addition to pack temperatures produced by the electrically heated packs for the two cycles previously mentioned,  $2\frac{1}{2}$  minutes on  $-12\frac{1}{2}$  minutes off, and  $1\frac{1}{2}$  minutes on  $-13\frac{1}{2}$  minutes off without the wool layer. (Room temperature remained constant for the former at 23.8 C. and for the latter at 25.2 C.). The lower graph shows — as against the upper graph — a higher maximum temperature and a more abrupt rise and fall in pack temperature. It is significant to note, however, that despite these differences, muscle and venous blood temperatures in the two graphs are approximately the same. During both cycles a peak muscle temperature of 38 C. was obtained, and muscle temperature variation during any on-and-off period in each cycle was less than 1 degree C.

Figure 4 shows the temperature changes produced by the conventional type hot packs applied for 15 minute periods. These results may be compared with the results produced by electrically heated packs as follows:

 Conventional type hot packs produced a more abrupt initial rise and fall in pack temperatures and a higher peak temperature than did electrically heated packs. The maximum pack temperatures produced by the conventional type hot packs were much more variable than those produced by the electrically heated packs.

3. A longer period, approximately 45 minutes, was necessary for electrically heated packs to produce maximum muscle temperature than was required for conventional type hot packs. However, once maximum temperatures were obtained, the two types of packs produced similar muscle temperature changes. Despite marked differences in pack temperatures, the muscle temperature curves were quite similar, and each type of application produced a peak of 38 C.

4. Conventional type hot packs produced up to 1.5 degrees C. greater

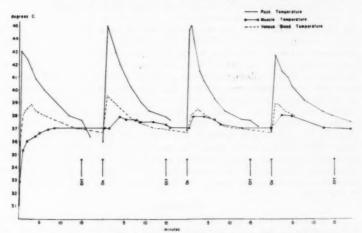


Fig. 4. — Blood, muscle and pack temperatures produced by conventional packs.

venous blood temperature rises than did electrically heated packs. It is possible that these differences are artefacts.

When the conventional type hot pack was kept in place for a two hour period, pack temperature gradually dropped from the peak temperature of 42.6 to 38.8 C. Muscle temperature during the same period gradually dropped from the peak temperature of 38 to 35 C., or 0.5 degree above the control value. When the pack was reapplied, muscle temperature again reached 38 C., a rise of about 3 degrees within a three minute period. Though the electrically heated packs could produce peak muscle temperatures equal to those produced by the conventional type hot packs, they could not produce as great variations in muscle temperature, since the short cooling time of the cycle used does not permit a comparable temperature fall between heating periods.

#### Comment

The practical advantages of the electrically heated packs are many.

- 1. The apparatus is easily portable.
- 2. A minimum of personnel is needed to carry out the treatment.
- 3. The technic of application is very simple.
- 4. Because the electrical device repeats the cycle automatically and the

pack does not have to be reapplied each time, the patient bears a minimum of discomfort during the treatment.

Because the pads are laced or wound securely, the patient can move his extremities while the treatment is in progress.

6. Since the heating mechanism is regulated from within, the patient is safeguarded, first, because neither operator nor patient can change the amount of heat or the specific cycle and, second, because the maximum temperature is below a level that might be injurious to the patient,

7. Once the commercial model becomes available, it will be completely grounded and the voltage will be transformed down to a safe level by means of an insulating transformer.

8. The apparatus could be modified to operate on batteries.

In addition to the insulating effect of the inner wool layer, there are two other possible causes for the gradual rise of pack temperatures. In this study a certain amount of instrumentation was necessary before the experiment could be got under way; during this time the inner wool layer, which had previously been moistened with hot tap, water, had cooled, and it was necessary to utilize subsequent heating periods to rewarm it. During actual treatment - not experiment - such delay can be eliminated; the inner layer can be warm at the beginning of the treatment. The second explanation concerns the instrument itself. At the start of a new application it is impossible to determine at which specific point of either the "on" or the "off" phase of the cycle the instrument was turned off after the previous experiment. Thus it may be necessary to wait up to 121/2 minutes or one "off" phase before heating begins; this delay permits the inner layer to cool. With the addition of a coupled time indicator in the instrument it would be possible to synchronize the application of the warm inner layer with the "on" phase of the cycle.

#### Summary

A method of applying moist packs electrically heated by self-contained thermal elements has been described, and the practical advantages and safeguards of this form of application have been indicated.

The cycle  $2\frac{1}{2}$  minutes on  $-12\frac{1}{2}$  minutes off, which is provided by the apparatus, appears adequate to produce a comfortable and safe tissue temperature rise.

Neither the maximum pack temperatures nor the temperature variation during any one on-and-off period produced by electrically heated packs was so great as those produced by the conventional type hot packs.

Although the actual pack temperatures produced by the two types of hot packs differ markedly, these differences are not reflected in muscle temperature changes. If one chooses to use hot packs to obtain increases in muscle temperature, there seems to be little advantage in the use of repeated 15 minute applications of the conventional type hot packs, whereby a very abrupt initial rise in pack temperature is produced. Since the two methods produced an almost uniform, high level of muscle heating, one might well use electrically heated packs.

#### Discussion on Papers of Dr. Harell, et al., Drs. Sweeney and Stoner and Mr. Howard Carter \*

Dr. Samuel A. Warshaw (Brooklyn): I want to congratulate the authors of the various papers. They are to be commended for a very excellent piece of research.

Their results will doing when we do it. The first paper, "Electrically Heated Hot Packs," and the second paper, "Hot Packing," can be discussed together with respect to the same principles. In order

<sup>\*</sup> Mr. Carter's paper appeared in the January, 1951, issue of the ARCHIVES.

to understand the features of these papers, one must know the anatomy and physiolcgy of the skin, hydrologically speaking. The skin consists of various layers; the one in which we are chiefly interested is the cutis vera, which contains the circulation, the papillae, coming directly to the surface, surrounded by layers of unstriated muscle. The unstriated muscle fibers react to heat and cold. When heat is applied, these fibers dilate or relax. The unstriated muscle fibers in the capillaries, which come to the surface, also dilate or relax; when heat is applied, the capillaries become engorged with more blood, producing a hyperemia. When the skin cools, this warm blood continues on from the capillaries into the venules and gradually into the veins and into the general circulation. When heat is applied, there is first a primary reaction of the skin, followed by a secondary general reaction warmed blood passes from the skin suraccounts for the first rise in temperature when heat is applied to the skin. the skin cools, it shows a gradual decrease in temperature due to the emptying of these capillaries caused by their contrac-When the secondary reaction takes tion. place and the deeper areas are flushed with warm blood, the circulation of the subcutaneous tissues and the muscles becomes involved and there is a rise in temperature in the muscle, as shown by the charts.

If one believes in the Kenny concept of treatment of poliomyelitis, hot packs are a very effective form of treatment. We have been using moist heat in treatment of various other conditions, such as neuralgia, neuritis and arthritis, in which excellent results are obtained with hot

packs.

The application of the electrically heated apparatus is a very efficient form of treatment if we believe in the Kenny treatment. It reduces the number of technicians necessary to give the treatments; in that way, I think, the electrically heated unit is very good. However, my colleagues and I have been using conventional hot packs and keeping them hot by means of an ordinary heat lamp applied over the moist pack, and in that way we have been

getting excellent results also.

As for spas, they have been one of my chief interests for many years. In 1936, Dr. Kovács, Dr. McClellan, Dr. Hansson and I visited some of the spas, and we found that all the owners were greatly interested in cooperating with the medical profession and wanted to know how the contact could be made. The next year Dr. Fantus was appointed chairman of the American Medical Association's commit-The committee - the previtee on spas. ous group, plus Dr. Fantus, Dr. McGuinness, Dr. Polmer and Dr. Singer - visited a number of spas throughout the United States and learned that the owners were also interested in finding out how they could establish contact between the average practicing physician and the spa. We

discussed the matter and concluded that the only way to get the other spas interested in cooperating with the physicians was to contact the various spas and explain to them the necessity of operating on a more scientific basis. Mr. Carter mentioned in his paper that there was an increase in the number of spas with medical direction. This was due possibly to the liaison work that we did voluntarily. Prior to our visits, there were only four of five spas that had some medical direction, but subsequently, as Mr. Carter stated, there were some 26 with medical direction.

It is my opinion that if a group of men such as this, interested in visiting spas, should again form and possibly divide themselves into subgroups to cover the various sections of the country, and these subcommittees — so to speak — should visit the spas throughout the United States, we might interest the spa owners in coming up to the standards that we should set. Of course, definite standards must be set up. We could then show the spa proprietors that we could be of help to them by informing physicians and lay public alike that these resorts can be safely recommended.

Personally, I feel that we have made great progress since 1936. We now have a group of physicians acting as a volunteer committee interested in health resorts and in hydrotherapy. This group is willing to continue in this work so that they can in some way get the spas and the physicians together in a cooperative spirit. We have been making great progress, and I think we could encourage the spa owners by informing them of this particular

project.

It also has come to my mind that we could get the owners or the medical directors or some representatives of the various spas to come to one of our luncheon meetings; invite them to come and explain to them exactly what we have in mind and what we want to accomplish, explain to them that we want to put them on a higher scientific level so that the medical profession would be proud to send patients to them, without any fear of losing them for the future. I think, in this way, we can make a quick application of our plan.

Dr. John D. Currence (New York): Regarding the paper of Dr. Harell, Dr. Mead and Miss Mueller, I can well concur that the method described certainly seems to have practical advantages and safeguards over the use of conventional type hot

packs.

The work of Dr. Sweeney and Dr. Stoncr is a very worth while evaluation of various effects of the application of heat to an extremity. Studies of this nature offer a great contribution to medical practice. In this presentation the attention is focused on poliomyelitis and neuromuscular disorders, but actually the prescribing of local heat is one of the most frequently utilized orders in the practice of medicine. This is true not only in physical medicine but also in the orders from traumatic surgery, orthopedics, vascular diseases and general practice. The medical director of one of our largest compensation insurance companies told me that the most frequent order for local heat, comprising over 80 per cent of the total, was for radiant heat using the infrared lamp. He also added that this fact was a very costly one.

Heat by penetration using short wave diathermy is undoubtedly next commonest in usage,

The use of heat by conduction, using hot packs, whirlpool or paraffin baths, certainly has many points of superior efficiency in the practical application of local heat. I should like to ask Dr. Sweeney his opinion as to the relative efficiency and practical usage of these modalities.

Mr. Carter's report seems to at least give a note of encouragement relative to the health resort situation. The Council regards health resorts as potential rehabilitation institutions, and I feel that several that are fortunate enough to have qualified medical supervision are now in this category.

The picture may change more rapidly with the tremendous strides that have been and are being made in rehabilitation. Many of the health resorts will be forced to place major emphasis on their sporting facilities. Many metropolitan rehabilitation centers will undoubtedly find health resorts ideal for interim, or especially terminal, phases of rehabilitation problems.

Although hydrotherapy is one of the oldest and widely used remedial agents known, it is used chiefly on an empirical basis by cultists and lay personnel. Hydrotherapy has been my pet interest for over 20 years. I have visited and studied procedures at many of the leading health resorts in the United States. Chairman of the Special Committee of Physical Therapy and later when Chairman of Public Relations of the New York County Medical Society, I conducted surveys relative to existing conditions. At the spas, as well as in New York City, scientific direction was an oddity. Use as a moral fence or as illegal practice occurred but only in a small percentage of The classified phone book has the places. pages of places to go for baths and massage. The volume of people who go for actual therapeutic reasons is undoubtedly greater than the total patient load in physical medicine

It seems quite futile to expect the cooperation of most of the health resorts. In my opinion the solution rests, first, in equipping our hospitals, rehabilitation centers, clinics and cooperative health resorts with expanded facilities for outpatient hydrotherapy; second, by an educational drive directed to the entire profession through the medium of medical journals, hospital staff meetings, county medical society meetings, motion pictures, announcements of increased facilities and divers other means.

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Dr. Mead (closing): In answer to the question by Dr. Currence about choice of heat sources in treatment, I think that the experience of the past two or three years of various investigators who have studied thermal gradients following the application of heat in various types of radiant and other apparatus shows that there is very little heating of the deeper tissues. The gradient falls off very rapidly indeed from the skin inward, and the conclusion seems to be necessary that many of the analgesic and other effects of heat administered in this way must be of a reflex nature.

It is therefore seemingly a matter of convenience as to what type of conductive or radiant heat you choose to use, together with the comfort of the patient and so forth. These considerations do not apply, of course, to conversive heating with short wave and microwave generators.

Dr. Sweeney (closing): In answer to Dr. Currence's question about the efficiency of hot packing as compared with other methods, we subscribe to the late Dr. Bassett's idea that heat is heat and it doesn't matter whether we use hot packs or infrared radiation just so long as we get the heat to the tissues that we are trying to treat.

Mr. Carter (closing): I wish to thank the discussers for their comments. It may be relevant to state that at the Council office approximately four letters per week inquiring about health resorts are received. I imagine that most of these letters are inspired by the patients of the general practitioners.



#### **AMPUTEE REHABILITATION \***

. COMMANDER THOMAS J. CANTY (MC), U. S. N.

Chief of the Navy Amputation Center and Orthopedic Surgery and Rehabilitation Officer of the
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Limbs, National Research Council

To a physician the word "rehabilitation" means "cure," or the full restoration of his patient to his former position in the family, community and work place. The treatment of a chronically ill or handicapped patient must be directed toward the whole being; it is not sufficient merely to treat the injured or diseased part. The patient's entire psychological, emotional, social and economic aspects must be taken into consideration. This is accomplished by a complete, well rounded, organized rehabilitation program. Rehabilitation can best be applied in a Rehabilitation Center.

The first Armed Service Amputation Center was established at the United States Naval Hospital, Mare Island, Vallejo, Calif., in 1943. This hospital has now handled over 2,500 amputees, and careful follow-up records reveal that 90 per cent of the patients who have passed through this center have been successfully rehabilitated. Through medical unification in the armed services, amputee patients of the Army, Navy, Marine Corps, Air Force, Public Health and Veterans' Administration are cared for at Mare Island.

The program at this center consists in (1) adequate medical and surgical care; (2) physical reconditioning of the body and stump; (3) provision with a modern, comfortable prosthesis; (4) training in the use of the prosthesis; (5) prevocational and educational services; (6) psychological aids and helps to the handicapped, and (7) selective job placement.

When a patient arrives at this center after suffering a traumatic amputation or a modified guillotine operation as a life-saving measure, the first job is to heal and re-form the stump. This is accomplished by skin grafting, plastic surgery, revision of reamputation, in order that the stump may be prepared to receive a prosthesis. More than 5,000 operations on amputees have been performed at this center without a single fatality due to amputation surgery. From the beginning, even while the patient is confined to bed, the educational services department intervenes, giving aptitude tests, holding vocational consultations and providing bedside courses and tutoring. Physical therapists next work with the patient, giving bed exercises and correcting postures. Occupational therapists provide a variety of bedside arts, skills and hobbies. Welfare and recreation departments, the chaplain and the Red Cross extend their services with spiritual assistance, books, movies, musical programs and ward parties.

Rehabilitation motion pictures are shown to the amputee group so that they may better visualize what to expect. Group therapy lectures are given to the patients in the manner of an open forum or round table discussion, and the patients are encouraged to discuss their individual problems. These

<sup>\*</sup> This article has been released for publication by the Bureau of Publications of the Department of Medicine and Surgery of the United States Navy. The opinions and assertions contained herein are the private ones of the author and are not to be construed as reflecting the opinions or policy of the Navy Department.

Read in the Section on Physical Medicine and Rehabilitation at the Ninety-Ninth Annual Session of the American Medical Association, June 26-30, 1950.

lectures afford psychological aids and help the amputee to understand his handicap and assist him in making the mental adjustment to his disability.

As the patient's wounds heal and he becomes ambulatory, the range of activity is increased. Physical training, including progressive exercises, is prescribed. Swimming and physical games are stressed. All this time the amputee may attend educational classes. His stump is shrunk by means of an elastic bandage, and special stump exercises are provided by the physical therapy department.

When the stump is sufficiently healed and shrunk, the prosthesis is fitted, and the patient then proceeds to the prosthetic training department, where he is taught balance, posture, gait and walking or, in the case of an arm amputee, the practical use of his prosthesis. After passing an achievement test he becomes eligible for leave. His activities are gradually expanded with prevocational training, work details, dancing classes, automobile driving and various sports and games. Thus, he gradually becomes adjusted to his prosthesis and, being able to view his own progress, can compete with his fellow amputees.

He is taught to be self sufficient, is not coddled and actually strives to be a better walker than his buddy, thus building up a spirit of competition. Upon discharge he can again face life, not as a burden to himself, his family and society but as a self-sustaining member in spite of his disability.

The artificial limb department at Mare Island conducts the research program on artificial limbs for the Navy. The program is in conjunction with the Advisory Committee on Artificial Limbs of the National Research Council. Work is presently conducted on 33 individual projects, and the work embraces almost every type of prosthetic device. The first plastic leg was developed at Mare Island. The projects include developmental work on the artificial foot, functional ankle, below-knee soft socket, variable cadence knee mechanism, suction socket, hydraulic tilting table prosthesis, cosmetic leg covering. For the upper extremity there is developmental work on a mechanical hand and cosmetic glove, functional elbow joints, the Navy-Fitch aluminum arm, pronators and supinators and a prosthesis for shoulder disarticulations. Work is being done on cineplastic prostheses, and a new type functional brace has been developed.

Research work in artificial limbs is difficult and time consuming. A mechanical device as a replacement for a human extremity is more than a mechanical gadget; it becomes a part of a man and replaces human functions. The neuromuscular and mechanical features with which nature has provided us in our human limbs, are truly the acme of mechanical genius, and mere man can only hope to provide a poor substitute, with very limited functions, as a replacement of God's own given human extremity. A successful prosthetic device must be simple, it must function in a normal-like manner and it must be alined and fitted properly in order that the amputee can wear it without discomfort. It must be light, strong, durable, economical in cost and cosmetically acceptable.

Through the work of the University of California on a project concerning fundamental studies of human locomotion, it has been shown that the forces and torques exerted about a given joint are tremendous. During the walking cycle, for instance, forces exerted at the shin area are in the neighborhood of 1 ton, and these forces are repeated with every step. The average man takes over a million steps in a year.

As a result of the research work on artificial limbs at Mare Island Naval

Hospital, improved prosthetic devices will be available, in the near future for civilian amputees, through commercial limb shops.

#### Report of Cases

Examples of the possibilities of rehabilitation from the case files of the United States Naval Hospital, Mare Island, may be cited.

CASE 1. — S. L., a Navy combat pilot, was shot down in the South Pacific and bailed out of his plane; a Japanese pilot dived on him and cut off his leg with the plane's propeller. Fortunately, this patient was picked up promptly from the water. He was brought back to Mare Island, rehabilitated and fitted with an artificial limb and returned to flying duty in the forward area. After the war he was discharged from the service and successfully operated his own commercial air line.

Case 2.— H. R. O., a 62 year old merchant marine, ferryboat captain on San Francisco Bay lost both arms in an accident. He was rehabilitated, fitted with prostheses and trained in their use. He is at present back on his former job as "skipper" of a ferryboat with a renewed license. Prior to rehabilitation he could only look forward to unemployment and required a full time attendant in order to dress, eat and perform the necessities of life.

Case. 3. — R. M., a Marine Corps sergeant, was one of the most severely injured casualties treated at Mare Island. A land mine explosion left him with his face horribly scarred; he was totally blind; one arm was lost and most of the opposite hand. In addition, he suffered injury and permanent disability to both legs. After a long period of treatment and rehabilitation he was discharged from the hospital and the question arose as to how this man might earn a living for himself, his wife and his children. His remaining assets were a good mind, a great heart and the power of speech and hearing. Though this case at first appeared hopeless, he was given a job with the Sacramento Fire Department as an alarm switchboard operator. He works an eight hour shift daily and he operates the switchboard with his remaining partial hand; he can talk and hear over a telephone and is successfully doing a job in an organization dedicated to the saving of life and property.

Case 4.— R. G. an Air Force jet pilot crashed in his plane in Panama and suffered severe burns that necessitated amputation of both his arms near the shoulder. He was admitted to the Mare Island Amputation Center, and through plastic surgery muscle motors were constructed in his chest muscles. With specially designed artificial arms, operated by the cineplastic motors, he is now able to care for himself fully, drive an automobile and is undergoing his vocational training.

Former patients are employed in all types of professions and trades, including lawyers, doctors, engineers, salesmen, congressmen, movie actors, bulldozer operators, and almost all sub-professional trades and labor.



#### UNDERWATER RESISTANCE EXERCISES

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The purpose of this presentation is to describe a technic for progressive resistance exercises under water. The basis of this program is the belief that an effective method of progressive resistance exercises can be developed by taking advantage of the relative density of water. It is well known that the force necessary to move through water increases rapidly as one increases the speed with which the object travels. In fact, if force were plotted against time (feet per second) the resultant curve found would be expotential in character. It is upon this physical fact that the underwater resistance exercise is based.

#### Apparatus

For the lower extremity a boot is used (fig. 1). A tennis shoe with the heel and toe cut out is riveted to an aluminum plate. This plate is attached as a hinge to a large rectangular blade at the posterior part of the shoe. The hinge is so constructed that the blade can be moved from the posterior to both sides of the boot in a 180 degree arc. There is also a double track running parallel to the vertical axis of the blade, which enables the hinge point to be adjusted in the upper or lower thirds of the blade. In this way the blade is able to straighten out in the anteroposterior or posteroanterior motion upon adjustment and to collapse upon the return,

For the upper extremity (fig. 2), there is a similar apparatus that can be held in the forearm. The hinge point of the blade on this piece is in the upper third, and this

blade can be rotated and held at any point in 360 degrees.

Splints can be attached to the above two pieces of apparatus if the proximal muscle groups are being exercised and the distal ones are too weak to hold the part in alinement. Although the heaviest piece of apparatus weighs less than 7 pounds submerged, in some cases it is advisable to render the apparatus weight free, and this can be done by attaching a block of balsa wood to the base of either the boot or the arm apparatus.

#### Technic

In exercising a specific muscle group, the muscle-testing positions for this group is approximated as closely as possible. The blade should be so adjusted that it will straighten out when the desired motion is executed and collapse on the return. After the boot or the arm apparatus is applied, the patient is encouraged to complete the motion previously demonstrated as fast as possible. The patient repeats the motion each time, while the instructor returns the part to the original starting position between each excursion at regular tempo. This is continued until the muscle group becomes fatigued, and fatigue is recognized by the following criteria: (1) obvious incoordination; (2) a loss of 10 to 15 degrees of the original arc of motion; (3) gross slowing of the rate in which previous repetitions were done, and (4) a genuine complaint of muscle discomfort by the patient.

If there should be no indications of fatigue, the maximum length of time which a patient should continue exercising a group is three minutes in one series. A minute is the unit of time upon which the number of repetitions is based and recorded. As soon as one muscle grou; becomes fatigued, the operator immediately readjusts the blade, positions the patient, and work is begun on the next muscle group. This procedure is continued through all the groups for which resistance exercises have been prescribed. After the last group in the assignment has reached the point of fatigue, or the maximum time of three minutes, a second series is started, beginning with the original muscle group exercised in the first series. The whole routine is repeated, and each time the patient is encouraged to push the blade through the water as fast as he can on each repetition. As each exercise is being done, both operator and patient are watching the second hand on a large electric wall clock. This is not only an inducement for the patient to work and try to better his time but is also a check on the daily work done. If four muscle groups were exercised in a treatment-period for the maximum length of time, each group could be exercised for three minutes in the two series. This leaves a total of six minutes for each muscle group in an exercise period. If this period is the usual 30 minutes, four groups could be exercised, leaving six minutes for adjustments. In fact, this technic is so variable that the maximum could be decreased



Fig. 1. — Smaller of two boots, showing the vertical track for blade adjustment (thumbscrew behind) when exercising muscles in anterior or posterior upper leg. Wing nut seen under heel of boot is for adjusting blade to either side for adductor or abductor-exercises. Spring seen between blade and wing nut assists the blade into the starting position at the end of the return motion.

and more groups included, or the time lengthened with fewer groups, should the overall picture or functional goal make it necessary.

#### Specific Exercises

A few of the more important individual exercises are shown in figures 3, 4 and 5, with an explanation given below each.

#### Comment

This technic is suggested as a possible method for progressive resistance exercise where water is available for therapy. When an operator has mastered this method, we have found that it is extremely variable and has many advantages.

In prescribing a program of progressive resistance exercises it is well to keep in mind the ultimate functional goal and to remember that only a limited time can be allotted to each patient for therapy. One can concentrate



Fig. 2. — Arm apparatus, showing the hand grip in center of circular stop for blade. The wing nut at bottom will hold the blade at any angle set in 380 degrees. This piece is also the smaller of two sizes. A larger blade has a greater area and, will have a tendency to decrease the number of repetitions and increase the load. Two sizes, in both leg and arm pieces, are all the units necessary for treatment of a patient of any age.

on one or two muscle groups or include several groups and still progressively work up the strength in the units prescribed for treatment.



Fig. 2. — Quadriceps exercise, showing a complete and free range of motion; on the return (in the inset) the blade is partially collapsed with moderate pressure against the spring. The force necessary to push the blade is near maximum at any point in the range of motion.

Since both patients and operator know the number of repetitions per minute that have been done for the individual muscle groups on previous periods, the control is known and the record continuous. The patient is encouraged to surpass the previous record during each therapy period, and

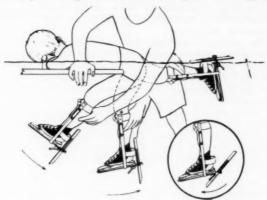


Fig. 4. — Muscles of the posterior hip are exercised with legs flexed over the end of the table. Blade can be seen with hinge point in the lower hird for anterior-posterior direction. Mechanism of return is seen in inset.

when the number of repetitions per minute or the number of minutes is increased for a muscle group it is recorded (or should there be a decrease in

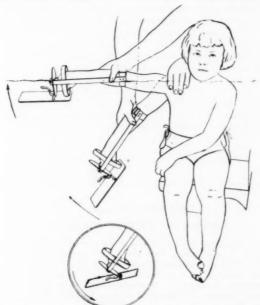


Fig. 5. — Blade is adjusted for the abductor exercise in this illustration. The blade approaches the surface of the water but does not break it. The part is returned to the starting position at an even tempo, while both patient and technician are watching the second hand on an electric wall clock. There is a chart of daily work done, and the patient is encouraged to better the previous record.

the number of repetitions per minute, which is frequently found in the first few therapy periods, it is also recorded). As the muscle groups become stronger in this form of exercise, the ability of the muscle to do increasing amounts of work is automatically taken up at the time this increase of strength is found in the group.

One of the greatest advantages in this method is that it is possible to put the muscle group exercised on the stretch and carry, it through the full range of motion. As the part is forcing the apparatus through the range of motion there may be minor positive and negative accelerations, but the force necessary will be, if not constant, the maximum amount that the group would be capable of exerting at any given angle in that range of motion.

Another main point is that both power and endurance are considered. It takes greater power to push the blade through the water at increasing velocities, and as the power increases there automatically are more repetitions done in unit time. Actually what is being developed is horsepower, or work per unit of time. Scientifically, this would be developing "power" in the true sense of the word.

Another advantage of working in water is the fact that one has a thermostatically controlled medium in which to work. Also, if the patient is submerged in the water a few minutes before the exercise program is started, the so-called "warm-up period" should be reasonably well taken care of.

It should also be mentioned that occasionally both agonist and antagonist muscle groups may be prescribed for resistance training. This can be accomplished very easily in one exercise. The blade of the apparatus can be held in the vertical position by the hand or by a drop lock on the upright, and in this way agonist and antagonist can be exercised alternately.

Not only is this method very efficient in quickly changing from ore muscle group to another, but also by using the buoyancy of water it is very easy to handle even the largest of patients. The apparatus is light to handle, for it is made of aluminum, and, by the way, is inexpensive to make.

#### Summary

A new method for doing progressive resistance exercises has been explained and the advantages given. It is our suggestion that this method be given a trial, if water is available, to supplement the other methods available today.

#### 29th Annual Session

#### SCIENTIFIC EXHIBIT SPACE

Requests for applications for scientific exhibit space in connection with the 29th Annual Session to be held at the Shirley-Savoy Hotel, Denver, Colorado, September 4 to September 8, 1951, are being received. Address all communications to the American Congress of Physical Medicine, 30 North Michigan Avenue, Chicago 2.

## PHOTOGONIOMETRY \*

## A New Method of Measurement of Range of Motion of Joints

HARRY T. ZANKEL, M.D.

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With the Technical Assistance of Paul Doelker, Chief, Manual Arts Therapy

#### CLEVELAND

The measurement of range of motion is an important requirement in the evaluation of injury or disease involving the locomotor system. Many goniometers, homemade or manufactured, are now available for this purpose. An improved instrument was recently described by Wilmer and Elkins, who also reviewed the literature.<sup>1</sup>

All goniometers, when properly used, will give adequate information as to the mobility of joints. Photogoniometry is herewith proposed as a new, and perhaps improved, method of joint measurement for the following reasons: (a) It is more accurate; (b) it is more susceptible to duplication by different technicians, and (c) it lends itself better to teaching, in that many observers can study the same joint measurements at the same time.

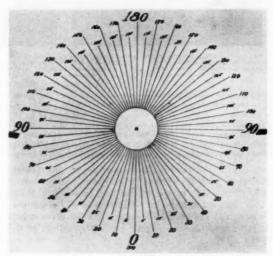


Fig. 1. — Scale printed on 2 by 2 inch slide and projected on the joint to be measured as described in the text,

The apparatus consists of three parts: (a) a projector for 2 by 2 inch slides; (b) a stand that permits horizontal, vertical and rotary adjustment, and (c) the gonio-

 Wilmer, H. A., and Elkins, E. C.: An Optical Goniometer for Observing Range of Motion of Joints, Arch. Phys. Med. 28:695 (Nov.) 1947.

<sup>\*</sup> Sponsored by the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the authors are the result of their own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

metric medium, namely, a glass slide (2 by 2 inches), upon which has been printed a circle divided into 5 degree segments (fig. 1), and marked bilaterally from 0 to 180 degrees.

## Technique

The patient is placed in a position that will allow maximum freedom of motion of the joint to be measured, with stability of the rest of the body. He can stand, or sit or lie down. It is important to have the joint that is measured so alined that the rays from the projector will fall perpendicularly to the plane of range of motion. The

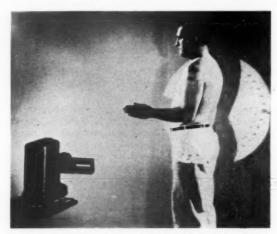


Fig. 2. — Photogoniometer in use, showing the degree of elbow flexion. Owing to the photographic technique 'be projector appears lower than the elbow; actually the center of the lens is on the same horizontal level as the fulcrum of the joint to be measured.

center of the goniometric circle is focused over the fulcrum of the joint; the immovable lever is fixed in the 0-180 degree line, and the reading of the angle is made directly on the movable lever of the joint. When there is some question as to the exact part of the lever to be read, a mark previously made with ink or other coloring will facilitate such reading. To permit easier angle readings in various positions, the slide can be set in the projector to conform to these positions, with the 0-180 degree line vertical when the patient is standing or sitting and horizontal when he is lying down.

The focusing of the rays is made possible by the construction of the photogoniometer in such a way that the projector can be moved horizontally and vertically to conform to the height and position of the patient. Provision has also been made for rotary adjustment of the goniometric slide so that the vertical and horizontal diameters can be accurately alined in the vertical and horizontal planes. Figure 2 is a photograph of the photogoniometer in use.

### Summary

A new method of joint motion measurement has been described called "Photogoniometry." The parts of a photogoniometer have been described and the technique outlined.

## ARCHIVES of PHYSICAL MEDICINE

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## .. EDITORIALS ...

# PHYSICAL MEDICINE IN OCCLUSIVE PERIPHERAL ARTERIAL DISEASE

Considerable difference of opinion exists as to the value of the certain physical procedures in the treatment of the occlusive peripheral arterial diseases. It appears that there are two main reasons for this lack of agreement on the efficacy of certain procedures in these conditions. The first is the attempt to apply the results of acute experiments on animals and normal human beings to the treatment of chronic occlusive arterial disease. It usually requires long and patient treatment in these cases to obtain results which can be objectively demonstrated by physical examination, skin temperature determination and oscillometry. The second reason for disagreement is the lack of controlled clinical studies on adequate numbers of patients. This could be done readily in cases of arteriosclerosis obliterans which are numerous, but would be a much slower process in cases of thromboangiitis obliterans which are less common.

The physical modalities which have been used and recommended in the treatment of the occlusive peripheral arterial diseases are: (a) Local heat in the form of thermostatically controlled infrared radiation, whirlpool baths, or diathermy; (b) Local contrast baths; (c) Heat applied to some distant part for reflex effect; (d) General heat in the form of fever therapy; (e) Special exercises; (f) Mechanical procedures such as the "Pavaex" boot, intermittent venous occlusion, and the Sanders oscillating bed; (g) Iontophoresis of histamine and mecholyl.

If local heat is to be employed at all in the treatment of the occlusive peripheral arterial diseases, it must be used with extreme care. A number of years ago, Starr¹ recommended a thermostatically controlled heat cradle for the feet, regulated to maintain a temperature of 91.5 to 95 F. The whirlpool bath may be used in the treatment of these patients if the temperature is very carefully adjusted to individual tolerance. Diathermy should not ordinarily be applied to an extremity with impaired circulation since it is difficult to gauge with sufficient accuracy the amount of heat generated in the tissues. The writer agrees with Bierman² that, in general, it is wiser to avoid the use of local heat in the occlusive peripheral arterial diseases.

The contrast bath is a potent accelerator of local circulation as recently demonstrated by Engel, Wakim, Erickson and Krusen.<sup>3</sup> Extremes of temperature should be avoided in peripheral vascular diseases. A maximum of 105 F. and a minimum of 50 F. with proper adjustment, in individual cases, should be the rule. The contrast bath may be useful in selected cases, al-

<sup>1.</sup> Starr, J., Jr.: Thermoregulated Foot Cradle for Treatment of Peripheral Vascular Disease, Proc. Soc. Exper. Biol. & Med. 29:166, 1931.

<sup>2.</sup> Bierman, W.: Physical Medicine in Peripheral Vascular Diseases, J. A. M. A. 141:315 (Oct. 1) 1949.

<sup>3.</sup> Engel, J. P.; Wakim, K. G.; Erickson, D. J., and Krusen, F. H.: The Effect of Contrast Baths on the Peripheral Circulation in Patients with Rheumatoid Arthritis, Arch. Phys. Med. 31:135 (Mar.) 1950.

though Prandoni4 stated that he has discontinued its use. Lowenstein5 has found that the contrast bath often accentuates rather than lessens pain and the writer is inclined to agree.

One of the most effective methods of employing heat in the occlusive peripheral arterial diseases is its application to some distant part for reflex effect on the blood vessels of the lower extremities. One of the best techniques is the immersion of the hands in hot water at 110 to 115 F. as is done in the Gibbon-Landis<sup>6</sup> test. However, heat may be applied to the trunk in the form of diathermy, or the simple electric heating pad, or to the pelvis by means of the sitz bath. A recent report of physiological studies by Wilkins, Halperin, and Litter further emphasizes the effectiveness of proximal applications of heat in producing vasodilatation in peripheral vessels. Such distant applications of heat overcome the spasm factor in the peripheral vessels and give maximal possible dilatation. If the spasm factor is great, the temperature of the toes may approach the temperature of the forehead during the beat application.

Hildenbrand<sup>1</sup> advocated the use of mild artificial fever in the treatment of thromboangiitis obliterans and reported some excellent results. The patient's feet are cooled while the rest of the body is heated in a standard fever cabinet. The writer has used the same method with similar results in a small series of cases. Ulcers heal, pain stops and the patient goes into remission. He does not usually relapse unless he resumes the use of tobacco, which invariably causes a return of symptoms.

Exercise is a potent stimulus to the peripheral circulation. It may be combined with the effect of gravity as in the well-known Buerger-Allen exercises. Buerger-Allen exercises should be individualized and adjusted to the patient by observing the circulatory reaction to change in position. The value of these exercises has been questioned by some, but since they are relatively simple and give the patient an opportunity of doing something for himself, they should be used in most cases. A more vigorous stimulus to the circulation in the legs is walking. Some maintain that the normal physiological vasoconstriction associated with the upright posture is detrimental, but others believe that walking, within the limits of fatigue and pain, is of definite value.

Exercise should be balanced with rest in the treatment of the occlusive peripheral arterial diseases. In acute phases with rest pain, ulceration or gangrene, bed rest is essential. During this time the head of the bed should be elevated to the point where the superficial veins of the lower extremities are very slightly distended, usually about 6 to 10 inches. Bed rest should not be prolonged longer than is absolutely necessary and during this time Buerger-Allen exercises should be prescribed unless the patient is on the Sanders bed.

There has been a tendency in recent years to discredit the mechanical procedures in the treatment of the occlusive peripheral arterial diseases. In a compartive study of the value the "Pavaex" boot, intermittent venous occlusion, and the Sanders oscillating bed, Horton, Krusen and Sheard<sup>8</sup> came

<sup>1.</sup> Prandoni, A. G.: The Use and Abuse of Physical Medicine in the Treatment of Peripheral Vascular Diseases, Arch. of Phys. Med. 32:100 (Feb.) 1951,

5. Lowenstein, P. S.: The Conservative Treatment of Thromboangiitis Obliterans and Arterioselerosis, South, M. J. 38:14 (Jan.) 1945,

6. Gibbon, I. H., Jr., and Landis, E. M.: Vasodilatation in Lower Extremities in Response to Immersing Forearm in Warm Water, J. Clin. Investigation 11:1019, 1932.

6. Wilkins, R. W.; Halperin, M. H., and Litter, J.: The Effects of Various Physical Procedures on the Circulation in Human Limbs, Ann. Int. Med. 33:1232 (Nov.) 1950.

7. Hildenbrand, E. J. C.: Evaluation of Treatment in Thromboangiitis Obliterans, South M. J. 38:178, 1945.

<sup>38:176, 1945</sup> 

s. Horton, B. T.; Krusen, F. H., and Sheard, C.: Evaluation of Methods and Mechanical Devices in Peripheral Vascular Disease, Arch. Phys. Therapy 22:388, 1841,

to the conclusion that the Sanders bed operated in an environmental temperature of 85 F. is the most effective. In fact, they found no evidence, either experimental or clinical, favoring the "Pavaex" boot or intermittent venous occlusion.

Almost simultaneously with the appearance of the article by Horton, Krusen and Sheard in 1941, Linton, Morrison, Ulfelder and Libby<sup>9</sup> reported measurement of blood flow in the dog's leg by means of the thermostromuhr during venous occlusion. They observed a marked increase in the arterial blood flow both by occlusion of the common iliac vein and by the pneumatic tourniquet. During occlusion of the common iliac vein the arterial inflow increased from 115 cc. to 210 cc. per minute and the venous pressure rose from 5 mm. to 25 mm. With the pneumatic tourniquet, however, the arterial inflow increased from 120 cc. to 280 cc. per minute and the venous pressure increased from 5 mm. to 75 mm. Linton, et al., reported no clinical studies.

More recently Wilkins, et al.,6-a reported that intermittent venous occlusion actually retards peripheral blood flow, although they did admit that they had obtained no information concerning its effect upon the development of collateral circulation.

Neither have clinicians agreed on the value of intermittent venous occlusion. The early reports of De Takats, 10 Collens and Wilensky 11 and Kramer12 were favorable. Lowenstein5 considered the "Pavaex" boot and intermittent venous occlusion as adjuvants of some value in the treatment of occlusive peripheral arterial disease. Bierman<sup>2</sup> reported in 1949 that positive and negative pressure and intermittent venous occlusion were then little used. Prandoni4 in a recent issue of the ARCHIVES stated that there is neither experimental or clinical evidence of the value of either positive and negative pressure or intermittent venous occlusion.

The Sanders bed is still considered a useful adjuvant in the hospital care of acute episodes in the peripheral vascular diseases. The cost of the apparatus, however, limits its availability.

A discussion of the use of physical agents in the treatment of the occlusive peripheral arterial diseases is not complete without mention of the vasodilating drugs, histamine and acetylbeta-methyl-choline (mecholyl). These produce vasodilatation of the blood vessels of normal skin but to a much less degree of the skin vessels in the extremities of patients suffering with peripheral vascular disease. In the iontophoresis of these drugs, into skin with impaired circulation, great care must be exercised to avoid galvanic burns which are slow healing even in normal skin. The writer rarely employs histamine or mecholyl iontophoresis at present in the treatment of the peripheral vascular diseases.

The place of physical medicine in the treatment of the occlusive peripheral vascular diseases is still not definitely defined. There is need for more of both experimental and controlled clinical study in this field.

<sup>9.</sup> Linton, R. R.; Morrison, P. J.; Ulfelder, H., and Libby, A. L.: Therapeutic Venous Occlusion, Am. Heart J. \$1,721 (June) 1941.

10. De Takats, G.: Intermittent Venous Hyperemia in Treatment of Peripheral Vascular Disease, Physiotherapy Rev. 18:7, 1936,

11. Collens, W. S., and Wilensky, N. D.: Intermittent Venous Occlusion in Peripheral Vascular Disease, Arch. Phys. Ther. 19252 (Apr.) 1938; J. A. M. A. 109:2125 (Dec. 25) 1937.

12. Kramer, D. W.: Intermittent Venous Occlusion in the Treatment of Peripheral Vascular Disease, Am. J. Med. Sc. 97:808 (June) 1939.

## MEDICAL NEWS

## Pennsylvania Academy of Physical Medicine

"Physiatric Problems Among Korean Casualties" was the subject presented by Lt. Col. Richard Dear at the regular March meeting of the Pennsylvania Academy of Physical Medicine. The meeting was held at Valley Forge Army Hospital, Phoenixville, Penna. Col. Dear covered the following topics (a) frostbite; (b) peripheral nerve injury; (c) spinal cord injury; (d) hand disability; (e) postfracture and (f) burn case,

## Course in Cerebral Palsy

The Cook County Graduate School of Medicine announces the two week Personal Course in Cerebral Palsy, given by M. A. Perlstein, M.D. and Associates, will be held this year from July 9th to July 21st.

This is an intensive didactic and clinical course in Cerebral Palsy intended primarily for physicians working with such children. It is designed for Pediatricians, Orthopedic men, Neurologists, Psychiatrists and Physiatrists. Enrollment is

All communications regarding this course should be addressed to the Cook County Graduate School of Medicine, 427 South Honore Street, Chicago 12, Illinois.

## Chicago Society of Physical Medicine and Rehabilitation

Veterans Administration Hospital Hines, Illinois

Wednesday, April 25, 1951 - 8:00 p. m. 6:30 p. m. - Dinner - Nurses' Dining Room -Vaughan Side

Business Meeting immediately following dinner. Annual Election of Officers Administration Building 100

Subject: Rehabilitation of the Amputee.

- 1. Introduction Dr. Louis B. Newman, Moderator Pathology, Physiology and Anatomy in Relation to Amoutations. Dr. George Barnett
- Stump Care, General Conditioning and Management of the Amputee. Occupational Therapy. Dr. Maxwell D. Flank
- Demonstration of Patients with Various Types of Artificial Extremities, Ambulation and Gait Train-ing. Dr. Louis Gereb Orthopedists' Point of View, Dr. Herman Joffe, Attending Physician, Orthopedic Service Veterans Administration Hospital, Hines, Illinois
- Question and Answer Period
- 7. Tour of the Physical Medicine and Rehabilitation Service at the Veterans Administration Hospital, Hines, Illinois

- Transportation: The Veterans Administration Hospital is on Roosevelt Road from First to Ninth Avenues, Maywood, Illinois.
- proceed on Roosevelt Road, turn south into First Avenue Gate; ask guard for directions to Subsidiary Administration Building 100.
- From Loop take Garfield Park elevated train to Des Plaines, then transfer to Hines Hospital Bus, ask driver to stop at Administration Building 100,
- All those attending dinner, will please meet in Adminis-tration Building 100, where group will be conducted to the Nurses' Dining Room.
- Louis B. Newman, M.D., Arthur A. Rodriquez, M.D., President Secretary-Treasurer

## Policy on Deferment of Hospital Residents During 1951

To meet the needs of the armed services, practically all the physicians in Priorities 1 and 2 wil! need to enter service in the relatively near future, according to the National Advisory Committee to the Selective Service System. But according to the law Priority 1 must be exhausted, either by call to active military duty or by Selective Service deferment, before individuals in Priority 2, except for those who volunteer for immediate active duty, can be called.

There are, however, within Priority 2, and even within Priority 1, a few persons who should be deferred because they are essential for teaching, for research, for public health services, or because they are rendering essential medical services in isolated communities. It is the intent of the Selective Service Law that such persons be deferred until replacements for them can be secured.

To meet the currently projected needs of the military service for medical officers, the great majority of physicians in Priority 1 will need to be on active duty within six to nine months. To accomplish this all interns in Priority 1 will need to enter service at the completion of their internships and should obtain commissions in advance of that date. The only justifiable exceptions are those interns who are accepted for residencies in the scarcity specialties. These scarcity specialties for the purpose of deferments are anesthesiology, physical medicine and rehabilitation, psychiatry, radiology, neurology, pathology, public health, orthopedic surgery, oral surgery and the basic medical sciences. Deferments that will permit a person to complete one or two years of training in these areas will provide the military services with persons who have some training in needed specialties and at the same time will help to meet the minimum essential staff needs of certain hospitals, teaching services and health departments

#### Personals

Dr. Edward Lowman has been appointed assistant professor, department of physical medicine and rehabilitation, New York University-Bellevue Medical Center. Dr. Lowman, now in charge of the physical medicine service at University Hospital, will work particularly on the cardiac research project.

Miss Mary E. Switzer has been named director of the Office of Vocational Rehabili-tation of the Federal Securty Agency, according to a recent announcement from Federal Security Administrator Oscar R. Ewing. She succceds Michael J. Shortley who has been appointed regional director of FSA Region III.

## Multiple Sclerosis Exhibit

An exhibit of selected books and journal articles on multiple sclerosis prepared by the National Multiple Sclerosis Society and the Library of the New York Academy of Medicine is on display at the library, 2 East 103d Street, to April 30, Mondays through Saturdays, 9 a. m. to 5 p. m. The material includes literature most useful to the practitioner, together with charts and photographs illustrating methods of rehabilitation. A list of the literature shown is available on request to the society at 270 Park Avenue, New York 17, or to the academy library. Other publications by the society are also on display and may be had from the latter on application.

## State Legislation Bills Introduced

California. — A.2326, proposes the creation of a state board of massage examiners and sets forth that the following are generally included in a regular course of study by a recognized and accredited school of massage: the art of massage either by hand or with any mechanical or electrical apparatus for the purpose of body massaging, reducing, or contouring, the use of oil rubs, salt glows, hot and cold packs, tub shower, sitz and similar baths, cabinet baths. Persons licensed to practice massage would be permitted to make use of the above methods.

Mevada. — A 57, to amend the chiropractic act, proposes regulations for the licensing of persons desiring to practice chiropractic-physiotherapy which is defined to be the adjustment of the articulations of the human body by hand and the use of electrical, mechanical, hygienic and sanitary measures, which measures do not pierce or sever the

New York.— A 2801, proposes to require a physician immediately to notify the health officer of the county, city, town or village where such person resides of every case of infantile paralysis under his care. A 2957, proposes to prohibit the use of the title "doctor" or abbreviation thereof in the conduct of any occupation or profession unless there is used, in conjunction with such title, the appropriate title "doctor of osteopathy" or "D.O." "registered physiotherapist," or "licensed physiotherapy" as the case may be. therapist, may be.

Orsgon. — S.271, proposes the creation of an Orsgon state board of massage examiners and defines massage as pressure or friction against, stroking and kneading the body. and symmastics, with or without such appliances as vibrators, infrared heat, sun lamps and baths, in order to maintain good health and establish and maintain the body in good health and establish and maintain the body in good physical condition. Under the proposal no person licensed as a masseur would be able to give chiropractic adjustments, osteopathic manipulations or naturopathic manipulations.

Washington — H.527, proposes the creation of a sanipractic physician examining board and defines sanipractic as the science and art of applied prophylactic and therapeutic sanitation which enables the physician to direct, advise, prescribe or apply food, water, roots, herbs, light, exercises (active and passive) manipulation, adjusting tissue, vital organs or anatomical structure by manual, mechanical or electrical instruments or appliances; or other natural agency to assist nature restore a psychological and physiological interfunction for the purpose of maintaining a normal state of health in mind and body; provided that this act shall in no way include the giving, prescribing or recommending of pharmaceutic drugs and poisons for internal use, the purposes of this act being to confine practice hereunder to sanipractic and not otherwise.

#### Bills Enacted

Georgia. — H. 115, has become Act 148 of the Acts of 1951. It authorizes the state board of medical examiners to examine and regulate applicants desiring to practice physical therapy which is defined to mean the treatment of any bodily or mental condition of any person by the use of the physical chemical and other properties of heat, light, water, electricity, massage and active and passive exercise. The use of roentgen rays and radium for diagnostic and therapeutic purposes, including cauterization, are not permitted under this new law.

and therapeutic purposes, including cauterization, are not permitted under this new law.

\*\*Rew York.\*\*—A.64t, has become Chapter 30 of the Laws of 1951. It amends the education law by constituting the board of medical examiners as a board of examiners in physical therapy.

## International Gerontological Congress

This congress will be held at the Hotel Jefferson, St. Louis, September 9-14 under the sponsorship of the International Association of Gerontological Societies, the Gerontological Society, Inc. and the American Geriatrics Society. Section I of the program, Biology and Medicine, is directed by John Esben Kirk, department of Gerontology, Washington University Medical School, St. Louis 9, Mo.; Section IV, Medical Services, Hygiene and Housing, Dr. Joseph W. Mountin, associate chief, Bureau of Medical Services, U. S. Public Health Service, Washington, D. C. Communications concerning papers should be sent to the director concerned. Albert I. Lansing, Ph.D., department of anatomy, Washington University Medical School, 660 South Kingshighway, St. Louis 10, is chairman of the committee on exhibits. Titles of papers with abstracts of not more than 200 words must be received by the program directors before May 1, and descriptive summaries of exhibits by Dr. Lansing, before May 1. The registration fee is \$10. It is recommended that room reservations be made as soon as possible at the Jefferson Hotel, St. Louis 3.

## The American College of Physicians Post-graduate Course No. 7 — Dynamic Therapeutics of Chronic Diseases (May 21-25, 1951)

New York University-Bellevue Medical Center Institute of Physical Medicine and Rehabilitation,
400 East 34th Street, New York, N. Y.

HOWARD A. RUSK, M.D., F.A.C.P., Director (Minimal Registration, 20; Maximal Registration, 30) Fees: A.C.P. Members, \$30.00; Non-members, \$60.00

Officers of Instruction RTHUR S. ABRAMSON, M.D., C.M., Chief, Physical Medicine and Rehabilitation, Bronx VA Hospital; Instruc-tor in Physical Medicine and Rehabilitation, New York University College of Medicine. JOSEPH G. BENTON, M.S., Ph.D., M.D., Instructor in Physical Medicine and Rehabilitation and Fellow in Medi-cine, New York University College of Medicine. JOSEPH J. BUNIM, M.D., Med.Sc.D., F.A.C.P., Associate Professor of Medicine, New York University College of

JOSEPH J. BUNIN, M.D., Mcd.Sc.D., F.A.C.F., Assessing Professor of Medicine, New York University College of Medicine.

DNALD A. COVALT, M.D., Associate Professor of Rehabilitation. New York University College of Medicine.

Of Dysical Medicine and Rehabilitation and Clinical Assistant in Medicine, New York University College of Medicine.

GEORGE G. DEAVER, B.P.E., M.D., Professor of Clinical Rehabilitation, New York University College of Medicine.

DOMINIC A. DONIO, M.D., Assistant in Physical Medicine and Rehabilitation, New York University College of Medicine.

cine.
WILBUR DURYEE, M.D., F.A.C.P., Professor of Clinical Medicine, New York University Post-Graduate Medical

School.
LUDWIG W. EICHNA, M.D., Associate Professor of Medi-cine, New York University College of Medicine.
WALTER W. FISCHER, M.D., Assistant Professor of Clin-ical Surgery, New York University Post-Graduate Medi-

Assistant Professor of Clinical Psychology (assigned to Physical Medicine and Rehabilitation). New York University College of Medicin LEONARD J. GOLDWATER, M.D., Professor of Industrial Hygiene, Columbia University School of Public Health, EDWARD E. GORDON, M.D., Assistant Clinical Professor of Physical Medicine and Rehabilitation, New York University College of Medicine.

MORRIS GRAYSON, M.D., Instructor in Psychiatry, New York University College of Medicine.

KARI. HARPUDER, M.D., Assistant Clinical Professor of Medicine, Columbia University College of Physicians and Surgeons.

Surgeons:
EDWARD F. HARTUNG, M.D., Associate Clinical Professor of Medicine, New York University Post-Graduate Medical School,
J. WILLIAM HINTON, M.D., F.A.C.S., Professor and Chairman of Department of Surgery, New York University Post-Graduate Medical School,
GERALD G. HIRSCHBERG, M.D., Fellow in Physical Medicine and Rehabilitation, New York University College of Medicine.

Post-Graduate Medical School.

GERALD G. HIRSCHBERG, M.D., Fellow in Physical Medicine and Rehabilitation, New York University College of Medicine.

ROBERT S. HOTCHKISS, M.D., Professor and Chairman of Department of Urology, New York University Post-Graduate Medicial School.

I'LLIA JONES, M.D., Professor of Internal Medicine, Collumbia University College of Physicians and Surgeons.

I'LLIA JUDSON, M.S., P. T., Supervisor, Home Management Project, Rellevue Hospital.

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I'LLIA JUDSON, M.S., P. T., Supervisor, Home Management Project, Rellevue Hospital.

I'LLIA JUDSON, M.S., P. T., Supervisor of Clinical Rehabilitation and Physical Medicine, New York University College of Medicine.

MORTON MARKS, M.D., Instructor in Neurology (assigned to Physical Medicine and Rehabilitation), New York University Post-Graduate Medical School.

JOHN H. MULHOLLAND, M.D., F.A.C.S., George David Stewart Professor and Chairman of Department of Surgery, New York University College of Medicine.

GERALD H. PRATT, M.D., F.A.C.S., Associate Clinical Professor of Surgery, New York University College of Medicine.

CORSAN REID, M.D., C.M., Professor of Experimental surgery, New York University Post-Graduate Medical Surgery,

HOWARD A. RUSK, M.D., Sc.D. (Hon.), LL.D., F.A.C.P., Professor and Chairman of Department of Physical Med-icine and Rehabilitation, New York University College of Medicine.

I.I.EN S. RUSSEK, A.B., Assistant Professor of Physical Medicine and Rehabilitation, New York University Col-lege of Medicine. ALLEN S. RUSSEK.

wARD SCHULTZ, M.D., Fellow in Physical Medicine and Rehabilitation, New York University College of Medicine. J. MURRAY STEELE, M.D., Professor of Medicine, New York University College of Medicine of Medicine, New York University College of Medicine. OTTO STEINBROCKER, M.D., Associate Clinical Professor of Medicine, New York University Post-Graduate Medical

School

WALTER A. L. THOMPSON, M.D., Professor and Chairman of Department of Orthopedic Surgery, New York University Post-Graduate Medical School.

The purpose of the course is the presentation of recently evolved techniques regarding the total rehabilitation of patients with chronic disabling disease. This objective, whether the phase of medical care," starts with the practice of good medicine and aims at the successful restoration of patients to maximal physical, psychological and vocational levels. The

responsibilities of the internist as consultant in many rehabilitative problems is recognized. The material presented will be predominantly clinical and will deal with the management of chronic diseases of interest to internists, such as the arthritides; hemiplegia; parkinsonism and multiple sclerosis; peripheral vascular disease; heart disease; and tuberculosis. Since many of the chronic diseases occur in the aged, and since the age distribution of the population is tending toward the older group, consideration will also be given to geriatric problems.

#### OUTLINE OF COURSE

MONDAY, MAY 21 - A.M. Session -

Registration 9:30-11:00 Registration
9:30-11:00 The Challenge of Chronic Disease.
Physiological Changes Consequent to Inactivity. Dr. Rusk.
11:10-1:00 Symposium on Evaluation of Disabilities. Dr. Rusk.

kusk.
History taking.
Muscle testing.
Joint mobility.
Joint mobility.
Activities of daily living.
Asychiatric aspects of chronic disease.
Psycho-social and vocational aspects in chronic diseases. Dr. Rusk and staff.
mposium on Use of Aids in Increasing Scope
f Activities.
Orientation. P.M. Session. Sy

Orientation Orientation.
Clinic: Use of braces, canes and crutches.
Clinic: Proper prescription of wheelchairs.
Clinic: Use of self-help devices.
Dr. Rusk and staff. 2:25- 3:25 3:30- 4:00 4:05- 5:00

c) d)

### TUESDAY, MAY 22 - A.M. Session -

Symposium on Arthritis.
9:00- 9:30 Clinic: Evaluation. Dr. Donio.
9:35-10:15 Steroid Therapy as an Aid in Rehabilitation, Dr.

9:35-10:15 Steroid Therapy as an Cou Training in Rheuma-tour Clinic: Management and Training in Rheuma-toid Arthritis. Dr. Rusk and staff. 11:50-1:00 Round Table: Arthritides and Related Diseases Drs. Bunim, Hartung, Rusk, Covalt and Deaver.

2:00. 2:30 Physiology of Muscular Exercise. Dr. Reid. 2:36. 3:00 Clinical Concepts of Fatigue and Muscle Tone. Dr. Reid.

Clinical Evaluation of Passive and Active Exer-

cises. Fir. Dacso.
Diagnostic Electromyography. Dr. Hirschberg.
Clinic: Management of Lower Motor Neurone
Diseases. Dr. Deaver.

## WEDNESDAY, MAY 23 - A.M. Session -

9:00- 9:16 Changes in the Peripheral Circulation of the Aged. Dr. Duryce.
9:50-10:50 Effects of Physical Agents on the Peripheral Circulation: Critical Evaluation of Thermal, Electrical and Other Agents. Dr. Harpuder.
11:00- 1:00 Chinic Diagnosis and Treatment of Peripheral Vascular Diseases. Drs. Harpuder, Fraft and

P.M. Sessio

Surgical Indications in the Aged, Dr. Hinton. C.P.C. (Subject to be announced), Clinic: The Low Back Syndrome, Drs. Thomp-son, Russek and Kraus.

#### THURSDAY, MAY 24 - A.M. Session -

9:00- 9:30

Symposium on Rehabilitation in Upper Motor Neurone Diseases. Newer Concepts of Organization of the Central Nervous System. Dr. Marks. The Cerebral Vascular Accidents. Dr. Benton. Analysis of Gaits. Drs. Marke and Hirschberg. Clinic: Evaluation, Management and Ret-zain-ing of the Hemiplegic. Dr. Rusk and staff. Round Table: Hemiplegia. Drs. Rusk, Deaver, Covalt and Steinbrocker. 10:45-12:00

Covalt and Steinbrocker.

P.M. Session. Symposium on Paraplegia with Special Emphasis on Problems of Nutrition, Decubitus, Infection and other Complications.

2:00 -4:15 Round Table Discussion. Drs. Rusk, Mulholland, Hotchkiss and Abramson.

4:25-5:00 Multiple Sclerosis; Parkinsonism. Drs. Gordon and Schultz.

## FRIDAY, MAY 25 - A.M. Session -

9:00-10:00 Symposium on Cardiac Diseases. 9:00-10:00 Physiological Changes with Aging. Dr. Steele. 10:10-10:40 Physical Fitness with Special Reference to Cardiac Disease. Dr. Eichna.

10:45-11:15 Energy Cost Studies as Related to Cardiac Discase. Dr. Benton.
11:25-11:50 Considerations of Capacity Versus Activity Requirements. Dr. Benton, Mrs. Judson.
12:00-1:00 Clinic: Rehabilitation of the Cardiac. Drs. Goldwater, Kossmann, Rusk, Benton, Grayson and Garrett.

P.M. Session.

Symposium on Rehabilitation in Tuberculosis 2:00- 2:20 Present Status of Ultra-Violet Therapy. Gordon. 2:25- 3:00 Clinic: Rehabilitation in Tuberculosis. D

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## Newly Registered Therapists

## February 26, 1951

Allen, Katherine A., 199 North Ave., Wakefield, Mass.

Barry, Barbara M., 150 Jason St., Arlington 74, Mass.

Chebookjian, Anahid H., 31 Newbury St., Somerville, Mass.

Goldman, Elaine R., 10071/2 N. Madison, Rome, N. Y.

Hentschel, Elizabeth J., 114 Hall St. S. W., Grand Rapids 7, Mich.

Hicks, Jeanne C., 1204 Craig Ave., Gastonia, N. C.

Lipshires, Barbara F., 130 Fuller St., Brookline, Mass.

Longley, Margaret H., 144 Elmwood Rd., Verona, N. J.

Magoon, Lois E., Gilman, Vt. Phillips, Joan C., 113 Pleasant St., Lowell, Mass. Savan, Joseph P., 6313 Cabanne Ave., St. Louis, Mo.

## March 15, 1951

O'Connell, Mrs. Peggy J., 41 W. 604th St., Orangeburg, N. Y.

Prince, Evelyn I., Box 703, Charlotte Amalie, St. Thomas, Virgin Islands.

Schnepper, Irma J., 342 Richmond Ave., South Orange, N. J.

Toker, Hilda S., 29 Lloyd Rd., Montclair, N. J. Whiteside, Robert M., 1107 W. 5th St., Storm Lake, Ia.

## March 19, 1951

Boland, Sr. Mary Bede, 1100 Bellevue, St. Louis, Mo.

de Kay, Raymond J., 196 Main St., Monson, Mass.

Milnes, William R., 1714 Yale, St. Louis 17, Mo. Scanlan, Mary W., 233 N. Vandeventer Ave. St. Louis 8, Mo.

Spurgeon, Floyd W., 3535 Henrietta, St. Louis 4, Mo.

Trlica, Raymond H., 344 S. Ellis, Cape Girardeau, Mo.

### March 22, 1951

Bernat, Regina, 1217 Pettit St., Dickson City, Bowrian, Helen, Rt. 3, Box 10, Valley Station,

Ky. Dority, Nancy, 528 Madison St., Clarksville. Tenn.

Henson, Nellie, Park St., Colebrook, N. H. James, Freeda, Rt. 1, Pocahontas, Ark. Leath, Mary, Jamestown, Ala.

Leroux, Lorraine, Blaine Ave., East Brookfield, Mass McElrath, Miss Don, 530 Allison Ave., S. W.,

Roanoke 16, Va. Mobbs, Mary, Box 396, Aberdeen, N. C. Ploss, Judith, Mill Hill, Grasmere, N. H. Schmidt, Florence, 324 Florida St., Buffalo 8,

Waters, Irene, 1814 5th St., Lake Charles, La.



## **BOOK REVIEWS**

MANAGEMENT OF PERIPHERAL ARTERIAL DISEASES. By Saul S. Samuels, A.M., M.D., Chief of the Department of Arterial Diseases, Stuyvesant Polyclinic Hospital, New York. Revised and Enlarged from "The Diagnosis and Treatment of Diseases of the Peripheral Arteries." Cloth. Price, \$7.50, Pp. 345, with 112 illustrations. Oxford University Press, 114 Fifth Avenue, New York 11, 1950.

This book is based upon the author's larger book "The Diagnosis and Treatment of Diseases of the Peripheral Arteries." A work that is justi-

fiably popular.

The first chapters present the symptoms and objective evidence of occlusive diseases in the ex-These few pages should be most helpful and reflect the experience of many, many years of experience. They are very practical. Thrombo-angiitis and arteriosclerosis are discussed with considerable detail. The importance of early diagnosis is sufficiently stressed to be impressive. His plea is made continuously for conservative treatment for he believes "the determination of the value of any therapeutic agent in peripheral vascular diseases must rest eventually upon the ability of the method to prevent amputation of the extremities." The various physical measures are evaluated with particular emphasis on the dangers of excessive heat to the extremities. Not all will agree that this method of applying the diathermy is the most effective; and no mention is made of the possibilities to be secured from reflex heating. Several case reports are given to bring out the salient points of diagnosis and treatment. Twelve short chapters cover the less common vasomotor disturbances as Raynaud's disease, periarteritis nodosa, frostbite, glomus tumor, ergotism, and others.

This is a short and straight forward presentation of the subject that demands the attention of the family physician, surgeon and physiatrist.

FUNCTIONAL ANATOMY OF THE LIMBS AND BACK. A TENTBOOK FOR STUDENTS OF PHYSICAL THERAPY AND OTHERS INTERESTED IN THE LOCOMOTOR APPARATUS. By W. Henry Holl inshead, A.B., M.S., Ph.D. Head of the Section on Anatomy, Mayo Clinic, Rochester; Professor of Anatomy, Mayo Foundation, University of Minnesota. Fabrikoid. Price, §6.00. Pp. 341, with 122 illustrations. W. B. Saunders Company, 218 West Washington Square, Philadelphia 5, London, 1951.

Functional anatomy of the limbs and back by Dr. Hollinshead should find a ready and enthusiastic welcome not only among the instructors of functional anatomy in the schools of physical therapy but also by the average physical therapist. This is one of the few books given to this most important subject and written from the viewpoint of the physical therapist. The author states that the text has been written under the assumption that it would be used primarily by students with only a slight background in biology, and probably no previous formal training in human anatomy. The text is intended for the beginning non-medical student of muscular movement, therefore, the essential anatomy is described as simply as possible. This text could be most profitably correlated with the course in anatomy which comes early in the student training.

The writer has successfully drawn together many facts and opinions which are found widely scattered through various sections of the larger texts of anatomy and in original papers in the literature. This material has been presented in a simple, lucid and logical manner. An outstanding feature of the book is the excellent and revealing diagrams which though not original are not copied

directly from any source.

Doctor Hollinshead tried the text when in mimeographed form, in his classes in anatomy for students of physical therapy before presenting his text in its present form. This undoubtedly aided the author to eliminate many errors that could only be found under actual test conditions.

The book is written in simple and understandable English. It errs perhaps, at times on oversimplification but that perhaps is not too serious an error. It is hoped this text will be widely used by physical therapists and physiatrists. Doctor Hollinshead is to be congratulated in presenting such a useful and valuable text. This volume is highly recommended.

THE CHEMICAL FORMULARY. A COLLECTION OF VALUABLE, TIMELY, COMMERCIAL FORMULAE AND RECIPES FOR MAKING THOUSANDS OF PRODUCTS IN MANY FIELDS OF INDUSTRY. Vol. IX. Editor-in-Chief, H. Bennett. Cloth, Price, \$7.00 Pp. 648. Chemical Publishing Company, Inc., 26 Court Street, Brooklyn 2, N. Y., 1951.

This book will be valuable in factories, laboratories, offices, hospitals, homes and everywhere, in fact, where people with initiative, intelligence and a thorough knowledge of chemistry may wish to solve their own chemical problems. It is a healthy reaction against the sales-pressure which at present forces upon the consumer so much of the ready-made, the proprietary, and the secret and compels him so often to choose among available products on the basis of uninformative Advertising.

The author gives formulas for adhesives, cosmetics and drugs; ceramics, glass, and cement; colloids; farm and garden products; food; ink and marking compounds; insecticides, fungicides and weed killers; leather, skins, and furs; lubricants and oils; metals; paint, varnish, lacquer and polishes; paper; photography; pyrotechnics and explosives; rubber, resins, plastics and waxes; soaps, cleaners and textiles. The terminology is modern, the metric system predominates and many recent chemical discoveries are represented. An ingenious system of indexing enables the reader to find name and address of the firm supplying a given needed raw material. In many respects, therefore, the book is a most welcome improvement over past books of formulas.

However, a hint of the dark ages lingers on page 585, where one learns that 36 bushels equal I chaldron, and in this respect the section on drugs (pages 107 to 117) is astonishing. Its contents include recipes for a "Compressed Tablet (Veterinary)" containing barium chloride, tartar emetic and strychnine sulfate; an iodoform tablet; stomach gripe water; ear pain deadener; urinary calculus solvent; cubeb cigarettes; antiseptic snuff, and (page 112) a "Hyperpara Thyroid Treat-The inclusion of this strange assortment prejudices the reader against the remaining contents. A section headed "Artificial Respiration" (page 584) recommends the procedure but fails to describe it.

Another section of medical interest is that on pyrotechnics and explosives. Although a pious remark on page 455 speaks of the elimination of chlorates, the author proceeds to give at least 22 formulas containing these treacherous compounds. The book can be recommended only to the mature and chemically trained reader.

RADIOACTIVE TRACERS IN BIOLOGY. AN INTRODUCTION TO TRACER METHODOLOGY. Second Edition, revised and enlarged. By Martin D. Kamen, Associate Professor of Radiochemistry, Edward Mallinckrodt Institute of Radiology, Washington University Medical School, St. Louis. Missouri. Cloth. Price, \$7.50. Pp. 429 with 53 illustrations. Academic Press, Inc., 125 East 23rd Street, New York 10, New York, 1951.

The rapid growth of the field of study which has opened up by the use of radioactive tracer methods in biology and medicine is most strikingly shown by the changes which this book has undergone from its first to its second edition in only three years. The author has found it necessary to rewrite much of the first edition, reducing material, leaving out some of the earlier results that have not proven to be consistantly valuable and adding a host of new material.

It is particularly striking in the increase of the amount of clinical data in this new edition. Physiological and medical experiments have been grouped in a separate chapter. This chapter alone contains over a hundred references, while the author admits that much work in the medical field has been omitted because he wanted to limit himself to the basic issues.

Clearly the methodology of tracer investigations

can be applied to almost any problem in biochemistry. The author has been fortunate in the selection of material which shows clearly what the promises and difficulties of the tracer methods

Brought up to date from the first edition, the second edition is again the best guide available for those who want to initiate themselves in tracer methodology.

RECOVERY FROM APHASIA. By Joseph M. Wepman, Ph.D., Clinical Instructor in Otolaryngology (Speech Pathology) and Lecturer in Psychology, The University of Chicago. Cloth. Pp. 276. Price, \$4.50. The Ronald Press Company, 15 East 26th Street, New York 10, 1951.

This is a relatively small, up-to-date book useful for all interested in the treatment of patients with brain injury or disease with associated speech disorders. The introductory section presents a concise review of the theories of etiology and pathology and suggests a simplified working system of classification and nomenclature. The second part of the book reports the success of aphasia training of veterans with brain injuries which represents a valuable research contribution. In the third part, theories and working principles are discussed in detail, also important background education recommended for the aphasia therapist. The need of a cooperative team including associated therapies such as occupational and recreational therapy is emphasized. Several chapters are devoted to details of therapeutic technique with a final section on illustrative case material. Each chapter is summarized and selected references are appended for student use.

The book is written in a style making it accessible and worth while for the use of all ancillary medical therapists dealing with aphasia patients as well as an excellent reference for the neurolo-

gist, neúrosurgeon and physiatrist.

EVALUATION IN PHYSICAL EDUCATION. By M. Gladys Scott, Professor of Physical Education, State University of Iowa; and Esther French, Professor and Head, Department of Health and Physical Education for Women, Illinois State Normal University. Cloth. Pp. 348, illustrated. Price, \$4.00. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Missouri, 1950.

This textbook has been prepared to provide students of physical education with an appreciation of testing motor activities and skills. Testing, the authors feel, is a necessary part in better teaching. In order to measure a motor function, whether it be in an exercise or in a sports event, a test is of much assistance. The authors explain the design, the technic of application, the scoring, the evaluation, and the statistical results of such tests. Understanding this, the reader may then extend the procedures. It is well to remember, however, that the value of a test depends upon logic as well as statistical comparison.

In the presentation, the authors have accumu-

lated considerable evidence revealing the need for test procedures, not to determine the physical fitness of a participant, but as a means of rating improvement in the carrying out of a motor function. In addition, there are many charts, score cards, and an exceptionally good bibliography.

This book may be recommended to teachers of physical education and also to those in physical medicine who desire a method of evaluating a motor function.

THE DOCTOR TAKES A FARM. By Jeff Minckler, M.D. Cloth. Price, \$2.50. Pp. 89. (Poetry.) Dorrance & Company, Inc., 364 Drexel Building, Philadelphia, Pa., 1950.

This book of humorous verse describes the experiences of a physician and his family after buying a farm. Their life with the cows and chickens, the hay and potatoes, the aphids and epizootics, is described in an exuberant style that does not slow down for minor difficulties with rhyme and meter. It is a good-natured, cheerful book, and there is real chuckle-producing humor in the illustrations by Jack Fruitt.

SWIMMING AND DIVING. By David A. Armbruster, Sr., M.A., Associate Professor of Physical Education and Head Swimming Coach, University of Iowa; and Laurence E. Morehouse, Ph.D., Associate Professor of Physical Education, University of Southern Californa; Interim Chief, Performance Physiology Section, United States Air Force School of Aviation Medicine, Randolph Field, Texas; and Formerly Research Fellow, Harvard Fatigue Laboratory. Second Edition. Cloth. Pp. 302. Price, \$4.00. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Missouri, 1950.

A well written and illustrated text for use of coaches and physical education students. The physiatrist will be interested in noting that heliotherapy and artificial ultraviolet irradiation are advocated for conditioning purposes.

AN OUTLINE OF SCIENTIFIC CRIMINOL-OGY. By Nigel Morland. Fabrikoid. Price, \$4.75. Pp. 285, with 12 pages of photography. Philosophical Library, Inc., 15 East 40th Street, New York 16, 1950.

This is an interesting and fascinating book written by the well known writer of scientific criminology. It is an attempt to contain between two covers most of the essential elements that goes to launching a definite outline of scientific criminology. Great care has been taken by the author to avoid errors. Each chapter closes with additional notes and an excellent bibliography. In all the author presents over 300 references for first hand study.

The book is divided into nine chapters and six appendixes. A chapter is devoted to each of the following subjects: fingerprints, identification of individuals, forensic ballistics, medical jurisprudence, forensic chemistry, documentary evidence and forgeries, cryptography and secret writing, microscope and camera and the applications of scientific criminology. The six appendixes are: equipment carried in a standard fingerprint field-outfit, portion of the specifications set forth in an average police description for the identification of a wanted criminal, some of the more common firearm calibres in the British, American and Continental relationships, blood grouping, a table of bone measurements at different ages and some functions (and facilities) of a well equipped forensic chemical laboratory.

This book is written for those interested in the latest scientific methods now being used in crime detection. The author while writing a scientific treatise does it so easily that one finds it an absorbing story. The uses of infrared photography and ultraviolet radiation while not unknown will interest many physiatrists. Some excellent sources on the literature are given in these fields which may be unfamiliar to many. While this book was not written specifically for physicians, the physician will find it both profitable and enjoyable reading.

NOSES. By Harold M. Holden, M.D., D.D.S., Ph.D. Cloth. Pp. 252. Price, \$3.50. The World Publishing Company, 2231 West 110th Street, Cleveland 2, 1950.

A serious study of the important part the nose plays in human psychology and physiology. This is based on art, folklore and literature as shown by the many quotations cited by the author. There are also case histories of neurotic phenomena related to nasal abnormalities and apparently cured by plastic surgery. A scholarly presentation of particular interest to plastic surgeons and students of medical history and lore.

PRACTICAL STATISTICS IN HEALTH AND MEDICAL WORK. By Ruth Rice Puffer, Dr P. H. Foreword by Hugo Muench, M.D. Cloth. \$3.75. Pp. 238, with 19 illustrations. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 18; Aldwych House, Aldwych, London, W. C. 2, 1950.

Statistics is usually considered a difficult and complicated subject that is restricted for the pleasure of a few mathematically endowed individuals. The vast amounts of material that are accumulated in the medical fields need statistical analysis to be utilized correctly, and to be analyzed properly. This book stresses the practical application of statistical data by giving the general principles of the analyses and by illustrating them with typical examples from the programs in Tennessee.

The author has had wide experience in the use of statistical methods and has prepared a book that should be valuable to other statisticians and the many workers in health and the other alllied medical fields.

## PHYSICAL MEDICINE ABSTRACTS

The Internist's Number One Problem — Chronic Disease in an Aging Population. Howard A. Rusk.

Ann. Int. Med. 33:1341 (Dec.) 1950.

In the minds of most internists, physical medicine and rehabilitation is a medical specialty which is primarily applicable to the specialties of orthopedics, surgery and neurology, but which lacks a close relationship to internal medicine. Until the last few years this concept was somewhat justified, for physical medicine was mainly concerned with the passive application of light, heat, water and massage, and, although widely used in the treatment of peripheral vascular diseases, arthritis and other disorders of particular interest to the internist, the greater emphasis was placed upon orthopedic and neurologic conditions.

However, during the past few years there has developed a new concept of physical medicine and rehabilitation in which emphasis is placed not only on reducing the physical disability of the patient, but upon retraining the permanently disabled patient to live and to work as effectively as possible with those remaining physical capacities which he

possesses.

The development of this new concept of dynamic therapeutics through rehabilitation had its genesis in the wartime programs for disabled service men. The need is now accentuated by the growing incidence of chronic disease resulting from an aging population. Lacking specifics to cure many of the chronic diseases, medicine must look to rehabilitation to teach the chronically disabled to live within the limits of their disabilities but to the hilt of their capabilities.

It is in the area of chronic disease that physical medicine and rehabilitation holds great implications for internal medicine, for probably threequarters of the time of the average internist is

spent on patients with chronic illness.

## Physical Medicine and Rehabilitation Study: One Year Report in Particular Relation to the Chronically Ill. Nila Kirkpatrick Covalt.

J. A. M. A. 144:1249 (Dec. 9) 1950.

The author has given a general outline of the purpose and organization, personnel and physical facilities of a Department of Physical Medicine and Rehabilitation which has been established as part of a study concerning treatment of the chronically ill in the state of Connecticut.

The 797 referred patients have been classified as far as is possible by disabilities, which appear to be the common denominator in planning a program of physical and total rehabilitation. A total program considers the physical, psychological, social and economic adjustments of each per-

son in order to utilize his remaining capabilities to the greatest extent, regardless of a residual physical disability.

It would appear from this report that definitive and functional physical medicine are needed concomitantly and that such treatment, planned or started at the onset of an acute illness, can prevent the development of chronic disabilities which lead to helplessness in the vast majority of cases. It is an excellent form of preventative medicine. The association of patients with acute illness which could result in disabilities and patients with chronic illness has served as a motivating factor

for those in each group.

In this study the number of chronic invalids who failed to accomplish any part of functional self care activities is approximately 15 per cent. The majority have all learned to walk with at least a fair degree of proficiency. Age has not been a determining factor. Adequate time for training has been important. A minimum of three months has been considered most necessary. Physical rehabilitation would have been impossible for many persons if all efforts to aid them had been discontinued before the end of this time. Six months to a year (or more) has been taken to complete training for some of these patients. The psychological factor, particularly relating to fear, secondary gains or motivation, has to be especially evaluated during the early period of rehabilitation. The time that should be spent on each patient in relation to the law of diminishing returns can only be evaluated after much more study.

The Effects of Short-Wave Diathermy on Bone Repair. William J. Hutchison, and Billie D. Burdeaux, Jr.

J. Bone & Joint Surg. 33-A:155 (Jan.) 1951.

The use of diathermy to stimulate the repair of fractures has been advocated and condemned by many, but the actual effects of short-wave diathermy on bone repair have not been studied experimentally. These experiments were done to determine the effects of short-wave diathermy in clinical or subclinical doses on bone grafts and fracture healing A standard short-wave diathermy machine was used throughout the investigation, and the following conclusions were reached:

Diathermy in repeated clinical doses causes a delay in the healing of fractures in rabbits and in the union of bone grafts in dogs. The newbone formation and callus are of poor structural quality. Diathermy causes a decrease in the formation of osteoporosis following bone trauma in dogs and rabbits. The continued use of diathermy in clinical doses causes edema of the skin, sub-

cutaneous tissues and muscles in rabbits. There is marked stimulation of hair growth in rabbits within four days following the use of diathermy. The use of diathermy causes a marked delay in the healing of surgical wounds in dogs and rab-

### Lesions of the Musculotendinous Cuff of the Shoulder: IV: Some Observations Based Upon the Results of Surgical Repair. Harrison L. Mc-Laughlin, and Edward G. Asherman.

J. Bone & Joint Surg. 33-A:76 (Jan.) 1951.

One hundred consecutive patients in whom shoulder-cuff repair was done were studied. These patients were followed for one to 11 years subsequent to repair, for an average exceeding three years. At the beginning of the study, it was believed that the position of abduction facilitated the healing of a cuff tear. However, the accumulation of evidence demonstrated this so-called "conservative abduction treatment" to be not only unnecessary, but also harmful to the healing of the rupture, to the shoulder mechanism and to the patient as a whole. Previous experiences with treatments requiring prolonged immobilization of the abducted arm demonstrated that these treatments often had a penalty more severe than that of the untreated original lesion,

A program designed to control pain and maintain the mobility of the shoulder proved to be the most efficient form of conservative treatment. A sling, and, if needed, a swathe were used during the acutely painful stages following injury. Both were discarded as soon as symptoms permitted. Appropriate palliative measures were employed as needed. Simple home measures of a palliative nature proved more efficient than formal physical therapy. Gradually, progressive active exercises and the resumption of use at frequent intervals up to, but not past, the limits of pain or fatigue, were insisted upon. Many patients in whom the diagnosis of cuff rupture was well established recovered on this regimen without further treat-

ment.

## Compression Fractures of the Spinal Column. John C. Ivins.

Minnesota Med. 33:154 (Feb.) 1950.

Such fractures are slow in consolidating; the mistake is commonly made of removing the plaster too soon. Flexion movement must not be allowed earlier than four months after injury. In the case of the comminuted fractures, it may be necessary to continue plaster immobilization for six months or longer.

Throughout the period of immobilization, exercises for the spinal and abdominal muscles are practiced regularly. A good system is to teach the patient a regular schedule of doing these exercises so many minutes out of each hour; they cannot be overemphasized. These exercises maintain the tone of the spinal muscles, and, if they are properly done the strength of the supporting musculature should be greater at the end of immobifization than it was prior to fracture. Such exercises tend to preserve normal flexibility in the spinal column and help in maintaining the patient's confidence in his recovery.

When a sufficient period of immobilization has elapsed, and roentgenograms show satisfactory bony healing, the plaster jacket is discarded. If the exercises have been faithfully done, it should not be necessary, in the average case, to apply a convalescent brace, such as the Taylor brace. These fractures commonly occur in people who work hard with their backs, and, in such instances an additional period of strengthening exercises may be necessary. For this purpose, regular gymnasium exercises are best; two or three months may be required for this phase of treatment.

### The Effects of Various Physical Procedures on the Circulation in Human Limbs. Robert W. Wilkins.

Ann. Int. Med. 33:1232 (Nov.) 1950.

During the past 10 years a series of physiologic studies has been carried out on the effects of various physical procedures upon the circulation in the limbs, in the hope of obtaining information of practical value in the physical therapy of peripheral vascular diseases. The purpose of the present paper is to review and summarize this work in order that clinical implications may be more easily derived. The physical procedures that have been studied may be grouped under three main headings: (1) heat; (2) posture, and (3) pressure cuffs. .

Some of the results described in this paper liave a practical bearing on the therapy of peripheral vascular disease. For example, reflex sympathetic vasomotor activity may be as important as local vasodilating factors in determining blood flow in the limbs. Furthermore, release of sympathetic vasoconstriction, as from warming the body, can have little adverse effect, except possibly through some side loss of arterial pressure in the proximal parts of distally affected limbs. Indeed, the patchy areas of gangrene that may appear in ischemic feet after a lumbar sympathectomy may be due, at least in part, to this mechanism. On the other hand local vasodilating methods, which in normal limbs produce marked increases of blood flow, may in diseased limbs not only fail to produce significant hyperemia but cause local tissue damage. Thus, the local application of heat, except of the most moderate and rigidly controlled sort, is a dangerous procedure in ischemic limbs which burn very easily. Likewise, attempts to cause local "reactive hyperemia" in limbs already ischemic appear not only futile but also hazardous, since extreme care is necessary in order to avoid traumatizing already devitalized tissues.

During Buerger's exercises a side loss of arterial pressure in the proximal vasodilated muscles may deprive the more distal and more needy parts of blood flow. Furthermore, muscular activity or tension in a limb greatly increases the utilization of and the need for oxygen. For these reasons it may be desirable in certain patients to use passive rather than active intermittent dependency. The definite increases in blood flow and oxygen tension found in the dependent limb would support such therapy. However, there seems to be no sound basis for elevation of the limb above the horizontal; on the contrary, a definite contraindication exists, since this procedure decreases blood flow.

No evidence was obtained in support of the rationale of intermittent venous congestion to relieve ischemia. In fact, all the data were in agreement that this procedure retards the blood flow. Admittedly, however, no observations were made bearing on the subsequent development of collateral circulation, a most important consideration in cases of peripheral vascular disease.

Apparently, local pressure of any degree reduces the blood flow in a part. Therefore, the pressure of dressings, casts, and even of the bedclothes on the limb, or of the limb upon the bed, should be avoided so far as possible. When linear acceleration of venous flow is highly desirable, for example, in order to prevent phlebothrombosis, and when arterial inflow is adequate even with local mild pressurization, the use of elastic stockings or other types of local compression may be clinically useful.

It is hoped that these physiologic observations will be of benefit in the future physical therapy of peripheral ischemic vascular disease.

## Heat Transfer in Man. D. K. C. MacDonald, and C. H. Wyndham.

J. Applied Physiol. 3:342 (Nov.) 1950.

Progress has been made, principally at the Pierce Laboratory and at the Fort Knox Laboratories in the United States of America, in the derivation of satisfactory equational forms for each of the principal avenues of heat exchange, radiation, convection and evaporation, between man and his environment and in determining the biophysical constants which govern each of these equations. This work is based upon "partitional calorimetry" in which heat exchange by radiation plus convection is determined from the algebraic sum of the rates of metabolic heat production, of evaporative heat exchange and of the change in heat content of the body mass. The last three heat quantities are directly measurable in principle. However, the situation in regard to the determination of the change in body heat content is unsatisfactory

Physical models of the body, incorporating heat and temperature generators, thermal conductances and capacities, have been developed for the qualitative and semi-quantitative analysis of heat transfer in man.

From the final model, one would expect an essential symmetry in the thermal responses of deep and of superficial tissues to the imposition of heat loads from within, by exercise, and from without, by exposure to high ambient temperatures; a reasonably clearly defined "time constant" or time of adjustment of deep tissues to the imposition of any new heat load; evidence of active control mechanisms which influence the variable factors in heat exchange, i. e., the internal conductance of heat in the body and the evaporative conductance of heat from the body surface. Experimental data have been obtained which

bear on these points by measuring the temperature of the rectum, mean temperature of the skin and weight of sweat excreted when heat loads were imposed successively from within and from

The model denotes clearly the nature of the adjustments in acclimatization. The initial and primary response to heat in the first day of exposure is a marked increase in the internal conductance of heat which may be so great as to produce circulatory insufficiency. Reciprocal adjustments of heat transfer from the body surface by evaporation and within the body of the internal conductance of heat occur in acclimatization, whereby the former increases and thereby allows the internal conductance to reduce and consequently relieves circulatory strain.

Both the increased sensitivity of the sweat mechanism on successive exposure to heat and the exhaustion phenomenon of sweating which occurs with time in a single exposure at high temperatures have a close parallel with the characteristics of "training" and of "exhaustion" ob-

served in psychomotor activities.

## Pain Threshold Studies on Paraplegic Patients. L. A. Hazouri, and A. D. Mueller.

Arch. Neurol. & Psychiat. 64:607 (Nov.) 1950.

Accurate interpretation of pain in the presence of paraplegia presents a challenging problem. Essentially two types of pain occur when the spinal cord has been severely traumatized: root pain and vascular pain. The latter appears intermittently with varying degrees of severity in almost all paraplegic patients. Surgical therapy for this type of pain has been ineffectual, although at first sympathectomy was viewed with hopefulness. On the other hand, it is desirable to treat the root type of pain surgically and early if addiction to drug and alcohol is to be prevented and proper rehabilitation of the patient is to be achieved. Experiences at this clinic indicate that lateral spinothalamic tractotomy is the operative treatment of choice in the presence of unquestioned root pain below the fifth thoracic dermatome. It is the purpose of this communication to present evidence fortifying the value of threshold studies and their application in molding the indications for surgical intervention in the treatment of pain in paraplegic patients.

The thresholds for perception of pain and for reaction to pain have been determined on 100 paraplegic patients who did not present a particular pain problem. The mean average of the threshold for perception of pain was found to be 230 ± 10 millicalories per second per square centimeter. When the pulse rate was employed as the indicator, the threshold for reaction to pain fell within an average range of 110 to 155 millicalories per second per square centimeter.

Three paraplegic patients with intractable root pain subsequent to injury to the cauda equina were studied before and after operation, as in the control group. Prior to surgical intervention for relief of pain, all three patients showed distinctly elevated thresholds for perception and for reaction to pain. After relief from pain by the lateral spino-thalmic tractotomy the thresholds for perception and for reaction to pain returned to a normal range in all three patients.

## Brace to Correct Varus of the Fore Part of the Foot. Harold Lusskin.

J. Bone & Joint Surg. 33-A:269 (Jan.) 1951.

Several cases of varus of the fore part of the foot have been noted, some of them as primary conditions, others as residual deformities of clubfoot. In some of these cases plaster casts were required when the patients were over a year old; in others the deformity could be controlled by a brace. The brace which has been used is made of leather and stainless steel, and is attached to the patient's foot by means of two straps. By adequate bending of the long arm of the brace, it is possible to increase the correction until the foot is in valgus. This brace is intended primarily for use in conjunction with strapping, but it may also serve as a night brace when strapping or other forms of therapy have been discontinued. It can be used whenever the child is not standing.

## Function of Erectores Spinae in Flexion of the Trunk. W. F. Floyd, and P. H. S. Silver.

Lancet 6647:133 (Jan. 20) 1951.

Observations are described which show that full flexion of the spine is accompanied by relaxation of the erectores spinae. Consequently in this position further flexion is limited only by the intervertebral ligaments. It is thought that there are limits to the time for which the ligaments can support this tension, in sitting, just as there are limits to the tension, which the ligaments can withstand in weight-lifting. Some clinical implications are described in backache and the mechanism of rupture of the annulus fibrosus.

## Emergency Wooden Respirator. Gerald M. Cline; Homer O. Dolley, and Ralph C. Osborn.

J. A. M. A. 145:485 (Feb. 17) 1951.

An "emergency" wooden respirator can be made and assembled in a few hours from materials usually obtainable in any community having a lumber yard, hardware store and garage or small machine shop. The respirator can be built by a carpenter or cabinet maker with some assistance from a sheet metal worker, blacksmith or garage man or a high school manual training class. The respirator may be constructed for hand operation; or if it is desired to operate the respirator by

motor, a washing machine agitator mechanism or a combination of belts and pulleys having a total reduction ratio of 120:1 from the motor to the cam link may be used. This ratio is important to give the proper respiratory frequency of 12 to

20 cycles per minute.

A pamphlet which graphically sets forth its construction has been prepared and is available for distribution on application to the Council on Physical Medicine and Rehabilitation of the American Medical Association. The photographs, drawings and specifications shown in the pamphlet are an accumulation of ideas on the various components offered as suggestions for making an emergency wooden respirator. Each community or group constructing a respirator of this type will have ideas of its own on improvision of various components, perhaps simpler or more elaborate.

## An Improved Abduction Exercise Splint for the Shoulder. Edward J. Coughlin, Jr.

J. Bone & Joint Surg. 33-A:267 (Jan.) 1951.

The author does not claim credit for devising this splint, but mentions that the original model had been seen by him at a prisoner-of-war camp in southern France. The author contacted the originator of the apparatus, Dr. Georg Neubauer, of Graz, Austria, who forwarded his own modifications of the original splint. In the modification of the original splint, the thorax is supported on both sides, which gives more adequate fixation to the apparatus and prevents it from moving in the process of abduction. In this way, one gets the maximum degree of abduction at the shoulder without untoward motion of the apparatus itself.

# Effects of Pituitary Adrenocorticotropic Hormone (ACTH) in Rheumatoid Arthritis. H. M. Margolis, and Paul S. Caplan.

J. A. M. A. 145:382 (Feb. 10) 1951.

Our observations indicate that the greatest degree of improvement is obtained in patients with early, mild or moderately severe rheumatoid arthritis, without serious capsular contractures or deformities, who require relatively small doses of pituitary adrenocorticotropic hormone (ACTH) and for whom the dose eventually can be reduced to practically minute amounts and for some can be entirely discontinued. The relief from discomfort, the decreased tendency toward the development of muscular and capsular contractures, the encouragement of the patient with regard to the possibility for help — all these factors more than compensate for the difficulty and expense attendant on the use of the substance.

The effect of long-continued administration, with the increased tendency toward production of undesirable "side effects" and deterioration of the degree of benefit obtained immediately after institution of treatment, introduces many serious problems that will require further investigation.

Although we were interested in observing pri-

marily the effect of pituitary adrenocorticotropic hormone on the rheumatoid process, it is obvious that in clinical management one should not eliminate the well tried general measures of treatment, especially physical therapy and the measures employed to prevent or correct deformity. The relief from pain and subsidence of the inflammatory process should, in fact, be exploited for the increase in muscle tone and strength which may be obtained through appropriate active exercises.

## Fractures of the Spine. Carruth J. Wagner.

Am. J. Surg. 80:424 (Oct.) 1950.

Fractures of the spine make up an important part of any orthopedic service. The results are much improved with the Watson-Jones method than previously and the incidence of traumatic neuroses in the compensation cases has been decidedly lowered.

In using the Watson-Jones technic of closed reduction of lumbodorsal fractures great care must be used to prevent hyperextension of the lumbosacral joint. Immobilization for four months with this joint in such a position will leave the patient with a disability that will exceed that of the fracture which is untreated. After removal of the plaster, flexion exercises should replace the hyperextension exercises the patient has been practicing during this immobilization.

## Evaluation of Deep Veins Following Previous Thrombophlebitis. J. C. Luke.

A. M. A. Arch. Surg. 61:787 (Nov.) 1050.

Luke studied by means of retrograde venography the deep veins of the leg in patients who had had thrombophlebitis from two to 25 years previously. He found that minimal venous damage could affect a leg as seriously as almost complete venous obliteration. The improvement occasionally seen following vein ligation could be due to the periarterial sympathectomy that of necessity is done on the femoral artery when it is freed and retracted to expose the vein. The author reemphasizes the part played by associated lymphatic blockage in the production of postphlebitic complications. This may be due to involvement of a large lymphatic channel coursing on the anterior aspect of the femoral vein. The edema resulting from chronic lymphatic obstruction and venous stasis favors the growth of organisms gaining entrance to this devitalized tissue. Therefore, the correction of chronic edema by means of either postural drainage of the leg or good compression bandages is most important in treatment. Active exercises of the leg are necessary to promote lymphatic and venous return. Regardless of the therapy used, the underlying factors in postphlebitic complications are still present, and continued care of the leg is an absolute necessity. All patients should be given a thorough explanation of their condition as well as the following instructions: Wear an elastic stocking all Do not stand for more than 30 minutes

without sitting down for 15 minutes and elevating the leg. Get into the habit of flexing the toes and rising on tiptoe frequently. Plan your day so that you can lie down for two to three half-hour periods and elevate your leg to a 45 degree angle (on the back of a straight backed chair). Whenever you sit down, elevate your leg. At night raise the foot of the bed about six inches. Apply a bland cold cream to the affected skin at night about every second day. Avoid irritation of the leg (sunburn, hot water bottles) and bumping, bruising or scratching the leg.

# Effects of Extreme Heat on Man: Protection of Man Against Conflagration Heat. Konrad Buettner.

J. A. M. A. 144:732 (Oct. 28) 1950.

Large scale conflagration and the heat flash of the atomic bomb not only add to the known dangers of fire but produce entirely new hazards. The laws of heat exchange from fire to man and those of his main physiological responses are briefly discussed. In addition to carbon monoxide poisoning and the many hazards caused by the vastness of the destructions, radiant heat is of the utmost importance. Hazards from intense heat can be thoroughly averted by use of aluminum-coated protective clothing.

## Poisoning as the Cause of Poliomyelitis. Ralph R. Scobey.

Arch. Pediat. 67:462 (Oct.) 1950.

Pascalis speaks about miasm as a cause of intermittent fevers. He says: "That such exposure proves generally unhealthful, it is readily granted, and they cause rheumatism, palsies, cramp, and a variety of other complaints."

Conventry, writing on endemic fever in the Genesee or Lake County of New York State, says that it begins with the most violent arterial action; yet ends in the most marked nervous debility. He states that Hippocrates, many centuries ago, described the disease under the appelation "causus."

"During the years mentioned (1792-1795)," he says, "I can truly say that few days occurred, from the middle or latter part of July to the setting in of the frost, about the middle of October, that did not afford me the opportunity of visiting a patient with endemic fever. Having for forty years observed the species of fever spoken of, always accompanied by, and never independent of vegetable and animal decomposition, that it was dependent on or orenected with that process. The deleterious effects of vegetable and animal of the deleterious effects of vegetable and animal of the deleterious effects of vegetable and animal or companied to the following the state of the deleterious effects of vegetable and animal or companies with the following the state of the deleterious effects of medicine abound.

Quarantines have been faithfully tried but are found wanting," he says.

A number of theories, other than the virus theory, have been proposed to explain the epidemiology of poliomyelitis. The "poison theory," which for centuries from the time of Hippocrates has been emphasized to explain the paralytic disases of the past and the poliomyelitis of more recent times, has been more or less generally ignored for almost half a century. Proof that poisons can cause poliomyelitis is given in this report. The so-called virus of poliomyelitis is consid-

ered to be an endogenous chemical substance resulting from this poisoning. Human poliomyelitis and the experimental animal disease are regarded as separate disease entities. It is pointed out that the more or less general acceptance of an exogenous virus as the cause of poliomyelitis has been influenced by exclusive virus research, mandatory public health laws that legally make poliomyelitis a communicable disease; and widespread virus publicity.

Treatment of Intertrochanteric Fractures of the Femur by Internal Fixation. G. P. Arden, and G. J. Walley.

Brit. M. J. 4688:1094 (Nov. 11) 1950.

Only of recent years have surgeons been stimulated to treat intertrochanteric femoral fractures by internal fixation as a means of obviating the long inactivity and bed-stay of the aged patient. No external support for the leg was used, the physical therapist starting active exercise of the affected hip 24 hours postoperatively. General leg and breathing exercises were also given. Patients were encouraged to get out of bed and sit in a chair within 12 days, and two weeks after the operation began walking on crutches without weight-bearing. At the end of four weeks they were discharged home, and attended the nearest physical therapy department twice weekly for exercises and the fracture clinic for follow-up. When radiographs showed satisfactory union the patient began weight-bearing; this usually was at 11 weeks after injury.

Hypothermia: Its Possible Role in Cardiac Surgery: An Investigation of Factors Governing Survival in Dogs at Low Body Temperatures. W. G. Bigelow, W. K. Lindsay and W. F. Greenwood.

Ann. Surg. 132:849 (Nov.) 1950.

The use of hypothermia as a form of anesthetic could conceivably extend the scope of surgery in many new directions. A state in which the body temperature is lowered and the oxygen requirements of tissues are reduced to a small fraction of normal would allow exclusion of organs from the circulation for prolonged periods. Such a technic might permit surgeons to operate upon the "bloodless heart" without recourse to extra corporal pumps, and perhaps allow transplantation of organs.

Hypothermia was induced in dogs, with shivering controlled by anesthetic, in order to study the physiology of the cardiovascular system and learn something of the mechanism of death at low body temperatures. This was investigated to improve our method of cooling with a view to excluding the heart from the circulation for longer periods. Re-warming was accomplished by means of a water bath at 40 C. There was a gradual fall of blood pressure, heart rate and

cardiac output to very low levels as cooling progressed, with a comparable rise on re-warming. Intense vasoconstriction was observed in the gross, and vascular stasis with erythrocyte agglutination observed microscopically at low body temperatures. Venous pressures proved a valuable guide to the condition of the heart. An increase in venous pressure over too long a period was often followed by "cardiac crisis" and it could be temporarily forestalled by venesection.

Electrocardiographic studies during cooling and re-warming are summarized. Ventricular fibrillation usually caused death between 16 and 22 C. Return of the heart from ventricular fibrillation to normal with revival has been accomplished by venesection and immediate re-warming. Cardiac resuscitation was attempted through a thoracotomy incision. A table of the possible causes of death has been drawn up and the various factors discussed.

Recent Concepts of Rheumatoid Arthritis. Oliver Abel, Jr.

J. Missouri M. A. 47:805 (Nov.) 1950.

Rheumatoid arthritis is a general disease and affects the individual as a whole, not just the joints. Necessarily, treatment must be directed to the whole individual, both his physical and mental states.

Proper rest to the individual as a whole and to the joints involved and attention to prevention of deformities and maintenance of function are of utmost importance. Definite rest periods and definite periods of exercising and activity should be prescribed, remembering a happy medium must be sought between no general activities and too much activity. Individual joints must be exercised first passively, as soon as the acute inflammation has subsided, and then actively for certain increasing periods each day. The amount of pain complained of and its duration and whether the pain with increased severity occurs should be the guide to the length of time of the exercises. Massage of muscles between joints associated with the exercises should be given. In regard to physical therapy, complicated and expensive apparatus is never necessary. Local heat in the form of light bulbs and pads will suffice. One of the best physical therapy measures at home is the hot tub soak. The individual, when able, should be placed in the tub and the time in the tub and the temperature increased as tolerated. While in the tub, the individual should be encouraged to move his joints. Deformities result when the parts are in flexion and this should be avoided. A proper bed is flat with a board under the mattress to prevent sagging so that the patient may rest in correct posture with joints extended. It is easier to prevent than to correct deformities. When flexion deformities have occurred, then the problem is chiefly orthopedic and it is not within the scope of this paper to go into orthopedic problems related to deformities.

## 1951 - 1952 DIRECTORY

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O. 15, % P. M., San Francisco, Calif.
Zimmerman, Johanna, 131 Devonshire St., Pittsburgh

Zimmerman, Lyndall, Address unknown. Zimmerman, Sophie, Micka Electric Co., Grand Rapids, Minn.

Zimmerman, Winifred, New Troy, Mich. Zimmermann, Ruth, 431 30th St., Oakland 9, Calif. Zink, Bernice, 141 Pratt, Fitchburg, Mass. Zitzer, Emma, 207 N. Brooks St., Madison 5, Wis. Zollmann, Gertrude, 5519 W. North Ave., Milwaukee 8, Wis.

8, Wts.
Zried, R. Jane, Varsity Apts., West Lafayette, Ind.
Zucker, Marguerite, 4007 N. 5th St., Arlington, Va.
Zufelt, June, Osaka Army Hospital, A. P. O. 25-5, %
P. M., San Francisco, Calif.
Zumwalt, Miriam, Box 41, Ft. Jones, Calif.
Zundel, Alice, R. D. 1, Negley, O.
Zwierlein, Thomas, 7124 Rhodes Ave., St. Louis 23,

Mo.

Zykofsky, Annette, Address unknown.

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Name	**********

# APPROVED SCHOOLS FOR OCCUPATIONAL THERAPISTS Council on Medical Education and Hospitals of the American Medical Association NOTE: The duration of the count is agreemed in Audusting 1971.

	Duration of of	Duration		Entrance Require-	Tuition	Certificate, Diploma	Gradu.
University of Southern California, 9231, 35th Place,	f Southern	Course 2 yrs.	FebSept	Degree	X420	Certificate	122
Los Angeles Mills College, Oakland, Calif	Mills College	5 yrs.	FebSept FebSept	High sch. Degree	\$200	Certificate	-
San Jose State College, San Jose, Calif	San Jose State College	11/2 yrs. 31/4 yrs.	Varies	Degree High sch.	\$ 21	Certificate Degree	01 2
University of Illinois Coilege of Medicine, 1853 W. Polk St., University of Iowa, Iowa City, Iowa	University of Illinois	5 yrs. 5 yrs.	Feb	High sch. High sch.	\$152	B.S. Cert.&Deg	7
University of Kansas, Lawrence	University of Kansas	2 yrs.	FebSept	Degree	\$131	Certificate	01 ~
Boston School of Occupational Therapy, 7 Harcourt St., Boston	Tufts College	2 yrs.	Sept	Degree High sch.	\$500	Diploma B.S.	13
Wayne University, 4841 Cass, Detroit, Mich	of Med, Coll. of Liberal	5 yrs.		High sch.			
Kalamazoo School of Occupational Therapy, Western	Western Michigan College	11/2 yrs.	FebSept	Degree	\$127	Diploma	20 20
Michigan State Normal College, Ypsilanti	- University of Michigan	5 yrs.	Varies	High sch.	\$118	Cert.&Deg.	80
College of St. Catherine, St. Paul, Minn.	The College of St. Catherine	t w w	Varies	l yr. coll.	\$210	Degree Degree	45
University of New Hampshire, Durham. Columbia University College of Physicians and Surgeons,	Univ. of New Hampshire	5 yrs.	Sept	High sch.	25.5	Certificate	208
630 W. 168th St., New York City		21/2 yrs.	Sept	2 yrs. coll.	<b>\$4</b> 50	Degree	_
Sq. E., New York City. Ohio State University, Columbus. Philadelphia School of Occupational Therany 419 S 19th St.	Ohio State University	41/2 yrs. 3 yrs.	FebSept Quarterly Sept	High sch. High sch.	\$500	Cert.&Deg. Degree Diploma	20 21
Philadelphia	University of Pennsylvania	3 yrs.	Sept	l yr. coll.	\$500	Diploma	35
	Texas State College for Women	5 yrs.	FebSept	High sch.	\$150	Degree	13
Richmond Professional Institute, 901 W. Franklin St., Richmond, Va.	Medical College of Virginia	3 yrs.	Sept Sept FebSept	Degree 1 yr. coll. Degree	\$350 \$350	Certificate	20 20
University of Wisconsin, Madison.  Minager-Downer College, Dept. of Occupational Therapy,	University of Wisconsin	5 yrs. 21/2 yrs.	FebSept FebSept Sept	High sch. High sch.	\$300 \$320 \$300	Cert.&Deg. Cert.&Deg. Diploma	× 27
6214 E. Martiord, Milwaukee Mount Mary College, 2900 Menomonee River Dr., Milwaukee University of Toronto, Debt. of University Extension.	Milwaukee-Downer College	4 yrs. Varies	Sept	High sch. Degree	\$335	Dipl.&Deg. Certificate	115
	University of Toronto	3 yrs.	Sept	l yr. coll.	\$222	Diploma	110
Colorado	Name of the latest of the late	5 yrs.	Sept	High sch.	******	B.S.	

#### **NEW DIRECTORY**

#### American Registry of Physical Therapists

(Formorly American Registry of Physical Therapy Technicians)

of the

#### American Congress of Physical Medicine

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#### MEETINGS OF INTEREST TO THOSE IN THE

#### FIELD OF PHYSICAL MEDICINE AND REHABILITATION

In this column will be published information about meetings of interest to those in the field of physical medicine. New data should be sent promptly to the office of the ARCHIVES, 30 North Michigan Avenue, Chicago 2, Illinois.

American Congress of Physical Medicine. — 29th Annual Session, Shirley-Savoy Hotel, Denver, Colo., Sept. 4, 5, 6, 7, 8, 1951. Walter J. Zeiter, M.D., Chairman, Convention Committee, 30 North Michigan Ave., Chicago 2.

Eastern Section, American Congress of Physical Medicine. — Philadelphia, Saturday, April 28, 1951. Albert A. Martucci, M.D., Secretary, Abington Memorial Hospital, Abington, Pa. See announcement, elsewhere this issue.

Section on Physical Medicine and Rehabilitation of the American Medical Association. — Wednesday, Thursday and Friday morning of the A.M.A. meeting (June 11-15, 1951) in Atlantic City. Secretary, Walter J. Zeiter, M.D., Cleveland Clinic Foundation, 2020 E. 93rd Street, Cleveland 6, Ohio.

Chicago Society of Physical Medicine and Rehabilitation. — Meetings, fourth Wednesday, January, through May, 1951. Next meeting Wednesday, April 28. Hines VA Hospital. See announcement, elsewhere, this issue. Arthur A. Rodriquez, M.D., Secretary, 30 North Michigan Ave., Chicago 2.

New Jersey Society of Physical Medicine. — Meetings, fourth Wednesday. James C. Hanrahan, M.D., Secretary, 678 N. Broad St., Elizabeth J. N. J.

New York Society of Physical Medicine. — Meetings, first Wednesday. Madge C. L. McGuinness, M.D., Secretary, 48 E. 62nd St., New York 21, N. Y.

Pennsylvania Academy of Physical Medicine. — Meetings, third Thursday. Charles Furey, Jr., M.D., Secretary, 2501 S. Cleveland Avenue, Philadelphia 45, Pa.

The National Society for Crippled Children and Adults, Inc. — 1951 annual convention, Palmer House, Chicago, October 3, 4, 5 and 6, 1951. Lawrence J. Linck, Executive Director, 11 So. La Salle St., Chicago 3.

American Physical Therapy Association. — Glenwood Springs, Colo., Hotel Colorado, June 17-22, 1951. Mildred Elson, Executive Director, 1790 Broadway, New York 19, N. Y.

American Occupational Therapy Association. — Annual Convention, Sept. 8 to 15, Durham, N. H., Wentworth - by - the - Sea Hotel. Co-chairmen, Eleanora Chernewski, VA Hospital, Togus, Maine, and Margaret L. Blodgett, U. S. Marine Hospital, Brighton, Mass.

#### International

International Congress of Physical Medicine (1952). London, July 14 to 19, 1952. Applications for the provisional program should be addressed to the Honorary Secretary, Dr. A. C. Boyle, International Congress of Physical Medicine (1952) 45, Lincoln's Inn Fields, London, W.C. 2.

European Congress on Rheumatism — Barcelona, Spain, Sept. 24-27, Dr. Gunnar Edstron, Lund, Sweden, Secretary.

International Gerontological Congress. — Hotel Jefferson, St. Louis, Mo., U. S. A., Sept. 9-14. Dr. John E. Kirk, 5600 Arsenal Street, St. Louis 9, Mo., Chairman, Program Committee. See announcement, elsewhere, this issue.

International Poliomyclitis Congress. — Copenhagen, Denmark, Sept. 2-7. Prof. Niels Bohr, Statens Seruminstitut, 80 Amager Blvd., Copenhagen S., Denmark, President.

International Society for the Welfare of Cripples.

- Fifth World Congress, Stockholm, Sweden, Sept. 10-14. Mr. Donald V. Wilson, 54 E. 64th St., New York 21, N. Y., U. S. A., Executive Director.

H'orld Consederation for Physical Therapy. — Sept. 7 and 8, 1951, Copenhagen. Further information may be obtained from Miss M. J. Neilson, Convener and Secretary, Provisional Committee, World Consederation for Physical Therapy, Tavistock House North, Tavistock Square, London W. C. I, England.

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#### 28TH ANNUAL CONFERENCE AMERICAN PHYSICAL THERAPY ASSOCIATION

June 16-22, 1951

Hotel Colorado, Glenwood Springs, Colorado

#### PROGRAM

#### Frontiers in Physical Therapy

(June 14-18 devoted to business meetings)

	(June 14-18, devoted to business meetings)
Tuesday, Jun	
9:00-12:00	Lower Extremity Amputee
9:00- 9:45	Basic Analysis of Gait, Charles Bechtol, M.D., Assistant Clinical Professor, Orthopedic Surgery, University of California
9:45-10:45	Rehabilitation of the Amputee, Donald Covalt, M.D., Associate Professor of Physical Medicine and Rehabilitation, New York University-Bellevue Medi- cal Center
11:00-11:45	Specific Problems in Relation to Fit and Alignment of Lower Extremity Artificial Limbs, Charles Bechtol, M.D., Assistant Clinical Professor, Or- thopedic Surgery, University of California.
11:45-12:00	Discussion Period
June 20th	
9:00-12:00	Chest Disabilities
9:00- 9:45	Anatomy and Physiology of the Chest and Respiratory System (description of tests for pulmonary function), speaker to be announced
9:45-10:45	Medical Care of Diseases of the Chest, Sidney H. Dressler, M.D., F.C.C.P., Assistant Medical Director, National Jewish Hospital, Denver; Special Consultant to the Officials of the United States Public Health Service in Tuberculosis
11:00-11:45	Physical Therapy in Medical Diseases of the Chest, Evelyn May, physical therapist, National Jewish Hospital, Denver.
11:45-12:00	Discussion Period
2:00- 5:00	Clinical Workshops
	Exercise Procedures for Chest Injuries, Pulmonary Tuberculosis, and Other Chest Diseases Which May Be Treated by Surgical Means: Evelyn May, physical therapist, National Jewish Hospital, Denver
	Electrical Stimulation and Testing: Margaret Moore, Educational Consultant, American Physical Therapy Association
	Lower Extremity Amputations
7:30- 9:00	Research Papers
June 21st	
9:00-12:00	Chest Disabilities
9:00- 9:45	Surgical Treatment of Injuries and Diseases of the Chest (other than tuber- culosis), speaker to be announced
9:45-10:15	Physical Therapy Following Chest Injuries and Thoracic Surgery Procedures (for diseases other than tuberculosis), Florence S. Linduff, Chief. Physical Therapy Section, Physical Medicine Rehabilitation Division, Veterans Administration, Washington, D. C.
10:30-11:15	Surgical Treatment of Pulmonary Tuberculosis, speaker to be announced
11:15-11:45	Physical Therapy in the Surgical Treatment of Pulmonary Tuberculosis, speaker to be announced
11:45-12:00	Discussion Period
2:00- 5:00	Clinical Workshops
2:50- 7:00	Exercise Procedures for Chest Injuries, Pulmonary Tuberculosis, and Other Chest Diseases Which May Be Treated by Surgical Means: Evelyn May, physical therapist, National Jewish Hospital, Denver.
	Exercise Techniques Used in Kabat-Kaiser Institute: Margaret Knott, Chief
	Physical Therapist, Kabat-Kaiser Institute, Vallejo, California Electrical Stimulation and Testing: Margaret Moore, Educational Consul-
	tant, American Physical Therapy Association
June 22nd	
9:00-12:00	Physical Therapy in Neuropsychiatry
9:00-10:15	The Psychology of Crippling and Chronic Illness, Laurence Fairchild, M.D., Assistant Professor of Psychiatry, University of Colorado; Director of Mental Hygiene, Public Health Department, State of Colorado
10:30-11:15	Medical Aspects of a Psychiatric Program, John J. Blasko, M.D., Chief of Professional Education, Veterans Administration Hospital, Gulfport, Mis- sissippi
11:15-11:45	Physical Therapy in a Psychiatric Program, Lola E. Smith, Chief Physical Therapist, Veterans Administration Hospital, Gulfport, Mississippi
11:45-12:00	Discussion Period

#### AMERICAN CONGRESS OF PHYSICAL MEDICINE

#### SPRING SESSION

#### EASTERN SECTION

In Conjunction with the New England Society of Physical Medicine, the Section on Physical Medicine of the Medical Society of the County of Kings, the New Jersey Society of Physical Medicine, the New York Society of Physical Medicine, the Pennsylvania Academy of Physical Medicine and the Society of Physical Medicine of the District of Columbia.

SATURDAY, April 28, 1951

Nurses' Lecture Hall, Philadelphia General Hospital

34th Street and Curie Avenue

Philadelphia 4, Pa.

MORNING SESSIONS — 10:00 A.M.

AFTERNOON SESSION - 2:00 P.M.

DINNER SESSION 6:00 P.M.

Penn Sheraton Hotel

#### Room 1 -

Bror S. Troedsson, M.D., Chairman

- The Use of Faradism in the Rehabilitation of Hemiplegics — MAX V. WEIN-STEIN, M.D., Chief of Physical Medicine, Brooklyn Hebrew Home for the Aged, Brooklyn, N. Y.
- Rehabilitation for Hemiplegics in the Home — HERMAN L. RUDOLPH, M.D., Reading, Pa.
- Ultrasonics in Clinical Medicine—HARRY H. ROSENTHAL, M.D., Associate Visiting Physician in Medicine, New York City Cancer Institute Hospital. Welfare Island, N. Y.
- Clinical Experiences with Ultrasonic Therapy—FRITZ FRIEDLAND, M.D., Chief, Physical Medicine and Rehabilitation Service, VA Hospital, Framingham, Mass.
- Multiple Purpose Tank SAMUEL S. SVERDLIK, M.D., Director, Physical Medicine and Rehabilitation, St. Vincent's Hospital, New York, N. Y.
- Historical Note: A Correction NOR-MAN E. TITUS, M.D., Downingtown, Pa.

#### Room 2 -

Jerome Weiss, M.D., Chairman

- Diagnosis of Injury to Roots and Branches of the Lumbar Plexus — LT. COL. RAOUL C. PSAKI, M.C., Senior Resident, Walter Reed Army Hospital, Washington, D. C.
- Management of Korean Casualties with Physical Medicine — LT. COL. RICH-ARD DEAR, M.C., Chief, Physical Medicine, Valley Forge Army Hospital, Phoenixville, Pa.
- Pathogenic Concepts of Fibrositis IR-VIN NEUFELD, M.D., New York, N. Y.
- Reflex Sympathetic Dystrophy: Shoulder-Hand Syndrome — CHARLES A. FU-R E Y. JR., M.D., Instructor, Physical Medicine, Jefferson Medical College, Philadelphia.
- Rehabilitation of Poliomyelitis J. MURL JOHNSON, M.D., Assistant, Physical Medicine, Southside Hospital, Pittsburgh, Pa.
- Techniques of Intensive Exercises in Early Poliomyelitis — ARNO D. GURE-WITSCH, M.D., Columbia-Presbyterian Medical Center, New York, N. Y.
- Physical Medicine and Rehabilitation in Psychiatry — JACOB MEISLIN, M.D., Chief, Physical Medicine and Rehabilitation, VA Hospital, Montrose, N. Y.

#### Afternoon Session - Lecture Hall - 2:00 P.M.

- The Present Needs of the Army in Physical Medicine COL. EMMETT M. SMITH, M.C., Chief, Physical Medicine Consultants Division, Office of The Surgeon General, U. S. A., Washington, D. C.
- The Present Needs of the Veterans Administration in Physical Medicine and Rehabilitation — ALVIN B. C. KNUDSON, M.D., Chief, Physical Medicine and Rehabilitation Division, Veterans Administration, Washington, D. C.
- Diagnostic Screening for Cerebral Palsy TEMPLE FAY, M.D., Professor, Neurosurgery, Women's Medical College, Philadelphia.
- Inconsistency in the Treatment of Cerebral Palsy JESSIE WRIGHT, M.D., Director, D. T. Watson School of Physiatrics, Leetsdale, Pa.

Discussion: William Benham Snow, M.D., Associate Professor of Physical Medicine, College of Physicians and Surgeons, Columbia University, New York, N. Y.

#### INTERMISSION

- What the Internist May Expect from Physical Medicine GEORGE MORRIS PIERSOL, M.D., Professor of Medicine, University of Pennsylvania School of Medicine, Philadelphia.
- The Effects of Microwave Diathermy EMERY K. STONER, M.D., Philadelphia.

Discussion: Charles S. Wise, M.D., Professor of Physical Medicine and Rehabilitation, George Washington University Medical College, Washington, D. C.

 The Treatment of Accessible Malignancy by Electrothermia Measures — WIL-LIAM H. SCHMIDT, M.D., Associate Professor of Physical Medicine, Jefferson Medical College, Philadelphia.

Discussion: William Bierman, M.D., Attending in Physical Medicine, Mt. Sinai Hospital, New York, N. Y.

Social Hour at the Penn Sheraton Hotel from 6:00 P.M. Banquet in Pennsylvania Room, Penn Sheraton Hotel from 7:00 P.M.

The Indications for Therapeutic Exercise — HANS KRAUS, M.D., Assistant Professor of Physical Medicine, New York University College of Medicine New York, N. Y.

Physicians, Other Professional Personnel and Their Guests Are Welcome.

Chairman, Sidney Licht, M.D., 30 Hillside Ave., Cambridge, Mass. Secretary,
Albert A. Martucci, M. D.,
Abington Memorial Hospital,
Abington, Pa.

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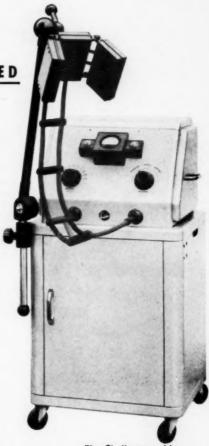
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